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Abstract

The 2015 series of RIO Country Reports analyse and assess the policy and the national research and innovation system developments in relation to national policy priorities and the EU policy agenda with special focus on ERA and Innovation Union. The executive summaries of these reports put forward the main challenges of the research and innovation systems.

Table of Contents

Foreword	4
Acknowledgments	5
Executive summary	6
1. Overview of the R&I system	12
1.1 Introduction	12
1.2 Structure of the national research and innovation system and its governance	15
1.2.1 Main features of the R&I system.....	15
1.2.2 Governance.....	15
1.2.3 Research performers	17
2. Recent Developments in R&I Policy and systems	21
2.1 National R&I strategy	21
2.2 R&I policy initiatives	22
2.2.1 Evaluations, consultations, foresight exercises.....	23
2.3 European Semester 2014 and 2015	23
2.4 National and Regional Research and Innovation Strategies on Smart Specialisation .	24
2.5 Main policy changes in the last five years	25
3. Public and private funding of R&I and expenditure	26
3.1 Introduction	26
3.2 Smart fiscal consolidation.....	28
3.2.1 Economic growth, fiscal context and public R&D	28
3.2.2 Direct funding of R&D activities	30
3.2.3 Indirect funding – tax incentives and foregone tax revenues	32
3.2.4 Fiscal consolidation and R&D.....	33
3.3 Funding Flows	34
3.3.1 Research funders	34
3.3.2 Funding sources and funding flows	35
3.4 Public funding for public R&I.....	38
3.4.1 Project vs. institutional allocation of public funding	38
3.4.2 Institutional funding	38
3.4.3 Project funding	38
3.4.4 Other allocation mechanisms	40
3.5 Public funding for private R&I	40
3.5.1 Direct funding for private R&I	40
3.5.2 Public Procurement of Innovative solutions	42
3.5.3 Indirect financial support for private R&I	44
3.6 Business R&D	44
3.6.1 The development in business R&D intensity	44
3.6.2 The development in business R&D intensity by sector.....	45
3.6.3 The development in business R&D intensity and value added.....	47
3.7 Assessment.....	48

4.	Quality of science base and priorities of the European Research Area	50
4.1	Quality of the science base	50
4.2	Optimal transnational co-operation and competition	51
4.2.1	Joint programming, research agendas and calls	51
4.2.2	RI roadmaps and ESFRI	52
4.3	International cooperation with third countries.....	53
4.4	An open labour market for researchers.....	54
4.4.1	Introduction	54
4.4.2	Open, transparent and merit-based recruitment of researchers.....	55
4.4.3	Access to and portability of grants	56
4.4.4	Doctoral training	57
4.4.5	Gender equality and gender mainstreaming in research.....	57
4.5	Optimal circulation and Open Access to scientific knowledge.....	58
4.5.1	e-Infrastructures and researchers electronic identity	58
4.5.2	Open Access to publications and data.....	58
5.	Framework conditions for R&I and Science-Business cooperation	59
5.1	General policy environment for business.....	59
5.2	Young innovative companies and start-ups	59
5.3	Entrepreneurship skills and STEM policy	60
5.4	Access to finance	61
5.4.1	Venture capital and business angels networks	61
5.5	R&D related FDI.....	62
5.6	Knowledge markets	62
5.7	Public-private cooperation and Knowledge transfer	63
5.7.1	Indicators	63
5.7.2	Policy measures	68
5.8	Regulation and innovation	70
5.9	Assessment of the framework conditions for business R&I.....	71
6.	Conclusions.....	72
	References	73
	Abbreviations	81
	List of Figures.....	82
	List of Tables	84
	Annex 1 – List of the main research performers.....	85
	Annex 2 – List of the main funding programmes	86
	Annex 3 – Evaluations, consultations, foresight exercises.....	87
	Annex 4 – Estimates of R&D expenditure sourced through national funds, structural funds and FP7	88

Foreword

The report offers an analysis of the R&I system in Malta for 2015, including relevant policies and funding, with particular focus on topics critical for EU policies. The report identifies the main challenges of the Maltese research and innovation system and assesses the policy response. It was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites etc. The quantitative data is, whenever possible, comparable across all EU Member State reports. Unless specifically referenced all data used in this report are based on Eurostat statistics available in February 2016. The report contents are partly based on the RIO country report, 2014 (Warrington, 2015).

Acknowledgments

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Executive summary

The report offers an analysis of the R&I system in Malta for 2015, including relevant policies and funding, taking into account the priorities of the European Research Area and the Innovation Union. The report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative and qualitative data is, whenever possible, comparable across all EU Member State reports. The report contents are partly based on the RIO country report, 2014 (Warrington, B, 2015).

Context

In the recent economic crisis Malta suffered less than many other countries and while the economy contracted in 2009, it registered growth in the following years (Eurostat Oct 2015). Economic growth is projected to remain robust, supported by strong domestic demand and increasing disposable income of households (EC, Feb 2015). In 2014 Malta's GDP was €8.11b, with a GDP per capita of €19,000 equivalent to 69% of the EU average.

An economic assessment of Malta's fiscal framework with the objective of strengthening this framework was published in 2013 (Ministry for Finance, April 2013) but did not make any specific mention of public expenditure on research and innovation.

Nevertheless, the country has followed the principles of smart fiscal consolidation since there have not been any reductions in public funding for research and innovation in recent years. Government debt was on the increase from 2007 to 2013 but then levelled off and decreased slightly to 68% of GDP in 2014. The budget deficit is under control and decreased from 3.6% of GDP in 2012 to 2.1% in 2014. As a result of this positive development and the good economic outlook, the European Council lifted the excessive deficit procedures against Malta in June 2015.

On account of Malta's small size, the R&I governance system is highly centralised and there is no regional dimension. The governance system is simple and stable, with well-defined responsibilities and few changes to the relevant structures over the years.

Malta's resilience and the limited impact of the financial crisis spared the country from cuts in R&I funding. R&D expenditure (GERD) has been increasing steadily since 2009 and almost doubled in monetary terms over the next three years, reaching 0.86% of GDP (€61.7m) in 2012 before dropping marginally in 2013. The increase was driven by increases in national funding as well as by the channeling of structural funds into R&I projects. Malta's target is to achieve an R&D expenditure of 2% of GDP by 2020. However, it is fair to say that the target appears somewhat ambitious, given that in 2014 GERD accounted for only 0.85% of GDP.

The business enterprise sector (BES) is the largest R&D performer, with an expenditure of €40m (51% of GERD) in 2014. In the higher education (HES) sector, research expenditure was €21m (31% of GERD), with most of this taking place at the University of Malta, which is the only Maltese public university in Malta. R&D expenditure by government and public research organisations was 9% of GERD and is one of the lowest in the EU. This is not surprising considering that Malta has only one public research organisation, the Malta Aquaculture Research Centre, while very limited research is conducted within government departments.

Latest key developments in the R&I system included:

- Operational Programme I (2014-2020) – *Fostering a competitive and sustainable economy to meet our challenges - ERDF, Cohesion Fund*, which was adopted in December 2014, was officially published in March 2015; Operational Programme II (2014-2020) – *Investing in human capital to create more opportunities and promote the wellbeing of society – ESF*, was approved in March 2015.

- National R&I Strategy 2020 was finally endorsed by the Government in February 2014, listing strategic areas for R&I support.
- Launch of new support measures: the 'Reach High' postdoctoral research grant scheme (April 2015) funded through the European structural funds (ESF programme) and Endeavour Postgraduate Scholarship Scheme.

Malta's National R&I Strategy 2020 is aligned with ERA priorities in broad terms, and work is currently underway on the development of an ERA roadmap. Due to the limited resources, the country cannot participate in a large number of joint research initiatives. As a general rule, cross-border access to national grants is not possible, and researchers affiliated in foreign institutions are not eligible for funding from Maltese grant schemes. Portability of national grants abroad is not possible in most cases. The share of top 10% most cited publications fluctuated across the years, but still lags considerably behind the similar size economies and EU average (Innovation Union Scoreboards).

Recent years have seen the introduction of a broad range of supply-side measures to encourage business investment in research and innovation with different degrees of success. These include a number of funding schemes providing financing for research and innovation activity, business incubators and entrepreneurship centres, R&D tax incentives. Nevertheless, investment in R&I remains at a relatively low level. Businesses report a shortage of applicants with the required skills, which is doubtless aggravated by the low unemployment rate. Demand-side measures are not actively used in Malta.

Malta is making progress in many R&I related areas and at the same time there are still remaining challenges. Possibly, there are some emerging issues, but there are also more comprehensive ones which need to be tackled as a priority and their solution would be beneficial to the overall R&I ecosystem. Having said so, the identified challenges for Malta's R&I system are:

Improving the quality of the science base – performance in research excellence lags behind and there is need to invest more in academic research;

Increasing R&I investment and output – R&I investment levels remain low and are coupled with underperformance in innovation output.

R&I Challenges

Challenge 1: **Improving the quality of the science base**

Description

The Research Excellence Composite Indicator ranks Malta (23rd in EU28) markedly behind the leading EU Members States. Compared with similar size economies and neighbouring countries, Malta is coping better, but is still lagging behind. The overall score of Malta increased, but starting from a very low base (17.73 in 2007 to 23.27 in 2012). Among the different components of the indicator, the highly cited publication and Patent Cooperation Treaty (PCT) patents decreased in 2012 compared to 2007, the top universities and PROs score remained the same and only the sum of European Research Council (ERC) grants increased. In terms of share of publications among the top 10% most highly cited Malta's performance fluctuated across years and the country (5.42% for 2000-2013) still lags considerably behind the similar size economies countries (LU – 9.68%, CY – 8.01%) and EU28 (10.55%).

Malta's latest investments in research infrastructures are supported through EU Structural Funds (2007-2013). While it is expected that these initiatives will continue during the next programming period, some delays could occur leading to a temporary dip in the developing of RIs. The investments were targeted mainly at UoM's laboratories and equipment and no large scale RIs are available in Malta.

Malta's R&I system is relatively young and small, which is reflected in sub-critical mass. The level of R&D expenditure in the higher education sector in 2014 (0.27% of GDP) was low compared to the EU28 (0.47%), with most of the funding allocated to the University of Malta, the main research performer in the higher education sector. The funding allocated to government research bodies was even less (0.08% of GDP, EU28 0.25%), which is not surprising since the country has only one PRO, the Malta Aquaculture Research Centre and the area in which it operates was not identified as one of the thematic priorities in the former national R&I strategy in force until 2014.

Malta does not have any funding programmes targeted exclusively at academic research, Funding for research projects is very limited, and there are few full-time researchers especially at the post-doctoral level¹. Malta has only 0.21 new doctoral graduates per thousand of population aged 25-34, compared to the EU average of 1.81, and ranks last on this indicator (IUS 2015). In absolute terms the number of researchers is small, with only 891 FTE in 2014, which accounted for 0.46% of the total active population, compared to 0.73% in the EU (Eurostat).

Policy response

The government, through the National R&I Strategy 2020, acknowledges the need to further strengthen the "knowledge base" and centres its efforts around three areas: investing in human capital; research infrastructures and capacity building for excellence in climate change adaptation.

Malta has set targets to be achieved by 2020 for both number of researchers and doctorate holders. A number of measures are in place to encourage more individuals to pursue studies in science and technology. A National Interactive Science Centre² is being developed with the aim of encouraging more students to opt for science subjects at secondary school level. At post-secondary and tertiary level, the monthly stipend allocated by central government to students following science and technology subjects is higher than that awarded to students following other subjects.

¹ Camilleri, J. (2010). *2020 Vision or Optical Illusion?*. University of Malta. Available at: <http://www.um.edu.mt/newsoncampus?a=111090>

² <http://esplora.org.mt/>

In order to increase the number of individuals with a doctoral qualification, the Malta Government Scholarship Scheme (MGSS), Strategic Educational Pathways Scholarships (STEPS) and Endeavour scholarship schemes were introduced. An important development is the launch of the Reach High Post-doctoral Grant Scheme in May 2015.

Malta has implemented several investment projects related to research infrastructures, mainly research laboratories at the University of Malta. Other infrastructure initiatives, although not targeted primarily at the science base, would be expected to have a positive impact in this area. These include the Malta Life Sciences Park³ and Digital Hub⁴ infrastructures which support the health (pharmaceuticals) and ICT-themed R&D. The ERDF allocations in the Operational Programme 2014-2020 include significant funding for new infrastructure initiatives.

Climate change adaptation was identified as a priority for capacity building in the National R&I Strategy 2020. There are initiatives and expertise in this area within the UoM (Climate Research Group), the Malta Resource Authority, The Malta Environment and Planning Authority and the Ministry for Sustainable Development, the Environment and Climate Change. Malta aims to consolidate it and build on these through the development of a centre of excellence on climate change. The Smart Specialisation Strategy outlines other areas of particular interest, where Malta will seek to build on existing and emerging capacity, e.g. tourism, maritime services, aviation and aerospace, health, resource-efficient buildings, high value-added manufacturing with a focus on processes and design, aquaculture and ICT as a cross-sectoral enabler.

Assessment

Malta has made great strides to address the issue with human capacity in R&I at all levels of education. The different scholarship schemes worked well in attracting more doctoral graduates^{5,6}, although the results have not yet been captured in the IUS indicators. The new post-doctoral grant scheme fills an important void in the funding system, although there is a danger that much of the funding will find its way overseas rather than being used locally. The targets set in the HR area are very likely to be achieved even before 2020, although it must be remarked that these targets are much less ambitious than the target for GERD. The continuation of existing support measures is very important for the continued development of researcher talent.

Significant progress has also been made with regards to the improvement of the research infrastructures, and the recent upgrades to equipment in a number of university laboratories permit the undertaking of better-quality research. Newly built facilities are in line with the priorities identified in the National R&I Strategy and the S3. Although small in scale by international standards, the allocation of ERDF funding for further investment in RIs planned for the current programming period (2014-2020) should considerably improve the knowledge base in the long-term perspective.

In spite of these positive developments, however, funding for public and academic research activity remains very low. Such funding is necessary to provide research opportunities for the growing researcher pool, and to enable the exploitation of the significant investments made in research infrastructures in recent years.

Although the rolling R&I Action Plan⁷ containing concrete measures has not yet been officially adopted, preliminary indications point to a possible match between developing

³ <http://www.lifesciencespark.com/>

⁴ <https://investinyourfuture.gov.mt/project/research-science-and-technology/the-development-of-a-digital-hub-50167817>

⁵ Ministry for Education and Employment, NCFHE (2015). Further and Higher Education Statistics 2013/2014, available at http://www.ncfhe.org.mt/uploads/filebrowser/NCFHE%20Statistical%20Report%20Collated_1.pdf

⁶ University of Malta, (2015). Completed Awards Statistics by Faculty. Available at: https://www.um.edu.mt/_data/assets/pdf_file/0004/235174/completedawards2013-14.pdf

⁷ The document is still in draft state. Once adopted and published a thorough check of the measures proposed will be needed.

excellence and S3 identified areas in health, aquaculture and aerospace. It is important that Malta further develops capacity in the selected fields through establishing high-class infrastructures and networking activities.

Challenge 2: **Increasing R&I investment and output**

Description

Various composite indicators measuring R&I position Malta on different places in the European landscape. The country is ranked 13th in terms of input, 8th in output and in terms of efficiency the country is holding 9th position within EU28 (according to the methodology used by Edquist). The IUS ranking for the same year (2015) positions Malta 18th in the EU28 and the Innovation Output Indicator - 16th (2012).

In terms of input, Eurostat provisional data indicate that in 2014 Malta's gross domestic R&D expenditure (GERD) was 0.85% of GDP compared to 2.03% in the EU28. Most of it was performed by the business sector (0.51% of GDP compared to 1.30% of GDP in the EU28). In private enterprise, the sectors with the highest R&D expenditure in 2012 were computer programming and pharmaceuticals, which together accounted for 54% of BERD. The R&D expenditure increased over the last years, but while progress is clear, provisional 2014 data indicates that the increase may not continue in the same trend as in the previous years.

Capitalising on the investment in R&I through the development of marketable products and services presents another challenge for Malta. SMEs in particular could well be lacking the necessary skills, or the finance to buy in the required expertise. National funding for private R&D is one of the lowest in the EU, standing at just 0.01% of GDP compared to an EU average of 0.09% in 2012. The level of privately-funded public R&D expenditure in Malta is extremely low – in 2012 it was only 0.6% of the total GERD. Further to that, the European Council recommended that Malta takes action in 2015-2016 to improve small and micro-enterprises' access to finance, in particular through non-bank instruments.

A number of indicators show that the innovative performance of Malta could further improve. Malta's patent performance is far below the EU average with only 0.22 PCT patent applications per billion GDP in current PPS against 3.78 in EU28 and licence and patent revenues from abroad are heavily shrinking (fallen from 0.78% of GDP in 2005 to 0.21% of GDP in 2012). The share of knowledge-intensive services export is 19.6% against 49.5% on average for the EU28.

Although there is an improvement in the economic effects in Malta compared to the last year, according to the IUS 2015, performance over the last 8 years decreased for 9 Member States, in particular for Malta and Greece. Declining performance is observed in particular for License and patent revenues from abroad (-15%), Sales share of new innovations (-11%) and PCT patent applications (-8.6%).

Policy response

The National R&I Strategy 2020 also addresses this structural weakness and highlights the need to create a comprehensive R&I support ecosystem. It aims to achieve this by tackling three areas: increasing the effectiveness of the delivery system, strengthening the capacity of entrepreneurial actors to innovate, and ensuring a seamless chain of support. The Smart Specialisation Strategy identifies areas in which innovation actors should focus their efforts, but no details on targets or financial commitment are clear yet. These are to be described in depth in the Action Plan, yet to be officially adopted.

In recent years various funding schemes and tax incentives were in place aiming to encourage private sector R&D (Fusion Technology Development Programme, R&D Grant Scheme, Innovation Actions Grant Scheme, R&D Feasibility Studies). These were complemented by fiscal and other measures aimed at commercialisation of research and promoting innovative startups (Fusion Commercialisation Programme, Takeoff Incubator and Seed Fund, Royalty income from Patents Scheme, JEREMIE).

Novel initiatives implemented or underway in 2015 include the Business Start scheme, Venture Capital Malta, a crowdfunding platform and a Multilateral Trading Facility.

The University of Malta has in recent years introduced measures to facilitate commercialisation of research such as the setting up of the Knowledge Transfer Office in 2009, followed by the TAKEOFF Incubator in 2014, intended to support early stage technologies and knowledge/technology-based start-ups. In 2014, the Ministry for the Economy, Investment and Small Business (MEIB) in partnership with the University of Malta launched the TAKEOFF Seed Fund Award (TOSFA) to provide proof of concept funds to support commercialisation of University technologies and pre-seed funds to support early stage start-ups at TAKEOFF. A total of €100k were allocated both in 2014 and 2015. The Centre for Entrepreneurship and Business Incubation (CEBI) was officially set up at the University in the first quarter of 2013 to teach entrepreneurship to students across Faculties and to educate and support graduates in the creation of successful Knowledge-Based business ventures. Related initiatives include the MCAST Entrepreneurship Centre and the ICT Innovation Hub. The Life Sciences Park aims to encourage local start-ups as well as attracting FDI in the biomedical field.

In the NRP 2015, the government tasked the responsible bodies to address the issue with access to financial markets and developing venture capital funds. Malta Enterprise has recently launched a start-up scheme which assists beneficiaries from this programme through a repayable assistance. Looking towards the future, the ERDF operational programme 2014-2020 specifies increased levels of funding dedicated to national infrastructure as well as to industry.

Assessment

There is clear evidence of a firm and sustained policy drive aimed at improving both R&I inputs and outputs in Malta. A broad set of measures are now in place and further novel initiatives were implemented in 2015. However, demand-side measures such as innovative procurement have not been availed of.

The effectiveness of most policy initiatives is not easy to assess rigorously due to the lack of data and formal evaluation studies. However, in terms of take-up, very successful initiatives include the Fusion Programme, the Innovation Actions Grant Scheme, JEREMIE, the Takeoff Business Incubator and Seed Fund. The ERDF R&D Grant Scheme enjoyed a lesser degree of success, and the original allocation was not fully taken up. Nevertheless most of the beneficiaries were SMEs and microenterprises and it should have a significant benefit on the R&I activities in the critical SME category.

On the other side, the indirect support to business was not properly evaluated but is considered to be able to trigger much more impact on R&I intensity in the future. The results based on modelling generated on the basis of the QUEST III model reveal that R&D tax incentives have the potential to heighten GERD to around 1% of GDP in 2020.

In spite of the significant improvements in the policy regime, however, levels of public funding for R&I remain very low compared to the rest of the EU. The Smart Specialisation Strategy identifies areas in which innovation actors are to focus their efforts, but no details on targets or financial commitment are clear yet. Allocation of ESIF funding to R&I for the 2014-2020 period is only 9% compared to an EU average of 12%.

1. Overview of the R&I system

1.1 Introduction

The Republic of Malta is situated in the Mediterranean Sea, 80 km south of Sicily and 330 km north of Libya, and consists of two main islands, Malta (247 square km) and Gozo (69 square km). With a population of just over 427,000 inhabitants in 2015, Malta is the smallest EU Member State accounting for about 0.08% share of the EU-28 total population (Eurostat, Dec 2015).

In the recent economic crisis Malta suffered less than many other countries and while the economy contracted in 2009, it registered growth in the following years and generally outperformed the EU as a whole (Eurostat Mar 2016). Economic growth is projected to remain robust, supported by strong domestic demand and increasing disposable income of households (EC, Feb 2015). In 2014 Malta's GDP was €8.08b, with a GDP per capita of €18,900 equivalent to 68.7% of the EU average.

Government debt was on the increase from 2007 to 2013 but then levelled off and decreased slightly to 66.9% of GDP in 2014. The budget deficit is under control and decreased from 3.6% of GDP in 2012 to 2.1% in 2014. Both indicators are forecast to continue improving in coming years (Ministry for Finance, Oct 2015). As a result of this positive development and the good economic outlook, the European Council lifted the excessive deficit procedures against Malta in June 2015. Nevertheless, the Council was not completely positive about Malta's finances and highlighted a number of issues, primarily the sustainability of the pensions and public health systems. The Maltese Government is committed to strengthen long-term fiscal sustainability of public finances in these areas. The Fiscal Sustainability Report 2015 published by the Commission in January 2016 has already shown that there have been improvements in the long-term sustainability of public finances, and that the age-related expenditure containment measures that are being applied by the Government are already producing positive results.

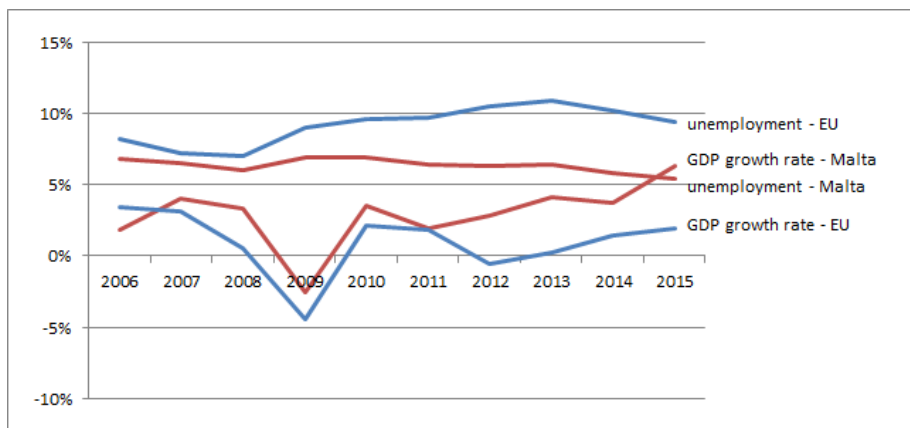


Figure 1. GDP and unemployment trends in Malta and EU

Unemployment is low and stood at 5.4% compared to an EU average of 9.42% in December 2015 (Eurostat Mar 2016). Labour market gains such as increased female participation, an increase in the working-age population and inward migration flows have contributed to the growth of the economy (EC, Feb 2015).

From a political perspective, Malta has two main political parties, one with conservative and another with social-democratic roots, but whose political ideologies have been converging in recent years. In 2013 the Labour Party was elected to government after almost 25 years in opposition, with a smooth changeover and few if any significant shifts in policy.

Malta has few natural resources and a small primary sector, with agriculture contributing less than 2% to Gross Value Added (GVA) in 2014 and the economy centred around manufacturing and services. While tourism and electronics have been important pillars of the local economy for a number of years, other sectors have recently emerged such as aircraft maintenance, financial services, online gaming and pharmaceuticals, indicating a shift in the economy towards higher value-added sectors and areas which are more knowledge intensive.

Table 1 Main R&I indicators 2012-2014

Indicator	2012	2013	2014	EU average
GDP per capita	17,200	18,100	18,900	27,500
GDP growth rate	2.8%	4.1%	3.7%	1.4%
Budget deficit as % of public budget	3.6%	2.6%	2.1%	3.0%
Government debt as % of GDP	67.4%	68.5%	66.9%	88.6%
Unemployment rate (% labour force)	6.3%	6.4%	5.8%	10.2%
GERD in €m	61.7	64.2	67.3	293,009
GERD as % of the GDP	0.86%	0.84%	0.83%	2.03%
GERD (EUR per capita)	147.9	152.5	158.3	560.1
Employment in HT and MHT manufacturing sectors as share of total employment	3.8%	4.1%	4.1%	5.7%
Employment in knowledge-intensive service sectors as share of total employment	44.9%	44.1%	43.6%	39.8%
Turnover from innovation as % of total turnover	15.2% (2008)	7.4% (2010)	10.2% (2012)	11.9% (2012)
Value added of manufacturing as share of total value added	confidential	confidential	confidential	confidential
Value added of HT manufacturing as share of total value added	confidential	confidential	confidential	confidential

Manufacturing GVA has fluctuated over the years, and Malta's low competitiveness especially in relation to Eastern Europe constitutes a significant barrier towards growth in this area (MCCEI, 2014). In contrast, the services sector shows steady growth (especially entertainment and e-gaming, financial services, ICT and professional services) with the result that whereas in 2004 manufacturing accounted for 15% of GVA, this fell to 10% in 2014. On the other hand, the contribution of the services sector to GVA increased from 73% in 2004 to 83% in 2014 (Eurostat Mar 2016).

Malta's resilience and the limited impact of the financial crisis spared the country from cuts in R&I funding. R&D expenditure (GERD) has been increasing steadily since 2009 and almost doubled in monetary terms over the next three years, reaching 0.86% of GDP (€61.7m) in 2012 before dropping marginally in percentage terms in 2013. The increase was driven by increases in national funding as well as by the channeling of structural funds into R&I projects.

Despite this generally positive performance, GERD is still low when compared to the EU average of 2.03%, and Malta ranks twenty-first in the EU in terms of R&D intensity (Eurostat Dec 2015).

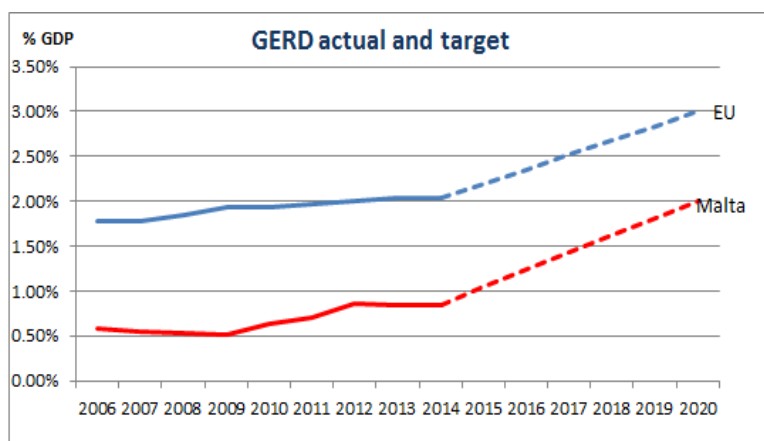


Figure 2 Malta and EU GERD performance as % of GDP and 2020 targets

Malta's target is to achieve an R&D expenditure of 2% of GDP by 2020 (MCST, June 2014), but the National R&I Strategy 2020 gives no indication of the planned contribution of the public and private sectors to this figure. Furthermore there are no details of how the target will be achieved, although it is expected that such details will be revealed in the R&I Action Plan currently under development. Because of this lack of detail it is not possible to objectively assess the chances of achieving the set target. Significant increases in GERD over the period 2009 – 2012 provided encouraging signs, but a downturn in 2013 highlights the danger of making predictions in the absence of a roadmap providing a sound basis for a proper assessment.

However, it is fair to say that the target appears somewhat ambitious, given that in 2014 GERD accounted for only 0.85% of GDP. Assuming a customary 2:1 ratio between private and public funding, the table below compares Malta's current and target R&D expenditure indicating that the greatest challenge is in the private sector.

Table 2 Comparison of current and target R&D intensity

	R&D as % GDP (2013)	Target R&D as % GDP	Current as % of Target
Private R&D	0.46	1.33	35%
Public R&D	0.39	0.67	58%
Total R&D	0.85	2.00	43%

With reference to innovation metrics, Malta scores below the EU average on most dimensions and indicators (IU Scoreboard 2015, EC, 2015). Turnover from innovation in 2012 was 10.2% compared to an EU average of 11.9%, placing Malta in 16th place in the EU. The figures vary wildly from year to year showing no definite trend and making it impossible to pass any meaningful comment. However, this is the case not just for Malta but also for many other EU countries, pointing to some difficulty in the data collection methodology.

1.2 Structure of the national research and innovation system and its governance

1.2.1 Main features of the R&I system

The business enterprise sector (BES) is the largest R&D performer, with an expenditure of €40m (51% of GERD) in 2014. In the higher education (HES) sector, research expenditure was €21m (31% of GERD), with most of this taking place at the University of Malta, which is the only Maltese public university. R&D expenditure by government and public research organisations was 9% of GERD and is one of the lowest in the EU. This is not surprising considering that Malta has only one public research organisation, the Malta Aquaculture Research Centre, while very limited research is conducted within government departments.

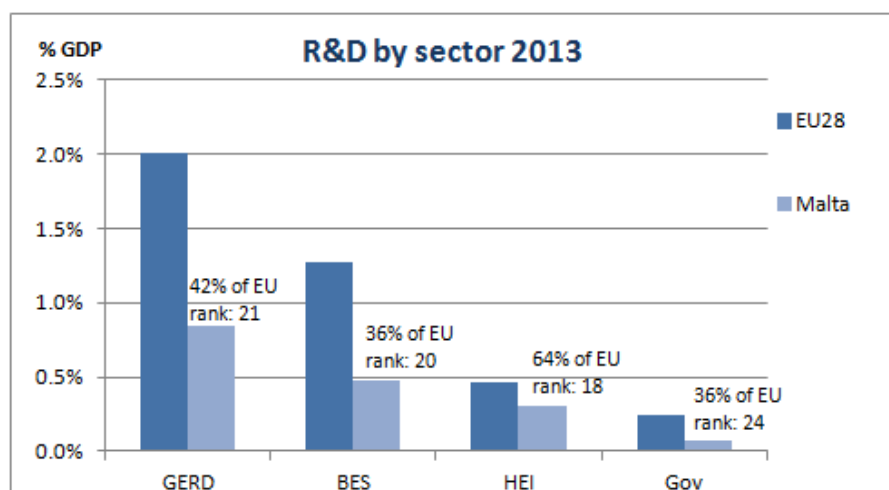


Figure 3 R&D expenditure of the different sectors as % of GDP in 2013 (Eurostat Feb 2015)

At just 0.85% of GDP, GERD in Malta equates to 0.42 of the EU average of 2.03%, On this basis, Malta's strongest sector is higher education at 0.56 of the EU average, followed by the private sector at 0.39 and the government sector at 0.31 of the corresponding EU average.

1.2.2 Governance

On account of Malta's small size, the R&I governance system is highly centralised and there is no regional dimension. The governance system is simple and stable, with well-defined responsibilities and few changes to the relevant structures over the years.

At the political level, 2013 saw the establishment of a new Parliamentary Secretariat with responsibility for Research and Innovation, but in spite of this political leadership in this area is still rather weak. In 2014 an inter-ministerial core group and a high level technical steering group were set up to oversee the implementation of the national R&I strategy under the stewardship of the Malta Council for Science and Technology. However, this group is not an officially constituted government body and lacks a formal mandate.

Policy orientations are defined in the National R&I Strategy 2020 (MCST, June 2014) which was formally endorsed by the Cabinet of Ministers in February 2014. The strategy is a high-level document and does not include budgetary commitments. It will be complemented by a detailed action plan which is currently under development and is scheduled for completion by the end of 2015. The strategy was developed following broad consultation with stakeholders.

The three key public bodies which are involved in promoting research and innovation in Malta are the following:

The Parliamentary Secretary for Research, Innovation, Youth and Sport within the Ministry for Education and Employment is responsible for research and innovation strategy and policy, delegating this responsibility to the Malta Council for Science and Technology (MCST) (www.mcst.gov.mt).

The MCST also acts as a central point for all science popularisation activities in Malta, as well as managing the FUSION Programme which is the main R&I funding programme based on national funds. The MCST has also been the national contact organisation for the framework programme for many years.

The Ministry for Economy, Investment and Small Business is responsible for Malta Enterprise (www.maltaenterprise.com) which is the national development agency and is responsible for the growth and development of Maltese enterprise, as well as for promoting and facilitating overseas investment in Malta. It operates a number of schemes promoting R&I in the private sector.

The Parliamentary Secretariat for EU Funds (eufunds.gov.mt) within the Ministry for European Affairs houses the managing authority for EU Structural and Investment Funds.

The Malta Chamber of Commerce, Enterprise and Industry (MCCEI) is the main independent organisation representing the business sector in Malta and incorporates an RTDI Committee which actively participates in R&I policy development. In 2012 it published a position paper proposing a number of actions for developing the R&I landscape (MCCEI, January 2012).

The Malta Chamber of Scientists represents the academic community in Malta but lacks organisational strength and is not very active in terms of input to the R&I policy-making process (www.mcs.org.mt).

The table below summarises the responsibilities of the key government bodies.

Table 3 Responsibilities of key public bodies with responsibility for R&I

Organisation	Policy responsibility	Operational responsibility	Scope of responsibility
MCST	National R&I Strategy Coordinating development of R&I Action Plan	Management of FUSION programme National contact organisation for H2020	all sectors
Malta Enterprise	Develop R&I schemes for industry	Management of R&I schemes for industry	industry
PS EU Funds	ESIF operational programmes	Administration of ESIF programmes	all sectors

Malta does not have an established system of programme evaluation, and this shortcoming is highlighted in the National R&I Strategy which calls for the establishment of such a mechanism. Review and evaluation exercises are sometimes carried out on an ad hoc basis (e.g. survey of participation in the COST programme (MCST, Oct 2014), review on participation in FP7 which also addressed the identification of barriers and remedial action (MCST Jan 2015). However, the MCST plans to undertake an evaluation of local funding programmes by the end of 2015. It is also in the process of setting up a monitoring mechanism for the National R&I Strategy and the Action Plan.

In recent years the QUEST III macroeconomic model has been used to assess the impact of R&I on economic growth (Ministry of Finance, April 2015). This is a Dynamic Stochastic General Equilibrium (DSGE) model developed by the European Commission and adapted specifically to the Maltese economy. However this exercise was very limited in scope and only one scenario was modelled relating to the effect of a tax credit incentive which could increase R&I intensity to 1% of GDP by 2020.

1.2.3 Research performers

Higher Education Sector

The University of Malta is the main research performer in the higher education (HES) sector. Most of the research is conducted in the field of Social Sciences followed by Medical Sciences, Engineering, Humanities and Natural Sciences in that order (Eurostat, Dec 2015).

The University receives most of its funding as a government block vote intended to cover all its capital and recurrent costs. After accounting for all its commitments, a relatively minor sum (less than €1m annually) is allocated for research and distributed to academic staff. There are no national funding programmes dedicated to academic research. Lack of national funding is therefore a major issue and prevents the University from achieving its research ambitions.

However, the lack of national project funding is a strong incentive for the University to seek alternative funding, with the result that it is the institution with the highest level of participation in FP7 in Malta, accounting for 26% of local participations in this programme (analysis of CORDIS data). The University was also the main recipient of structural funds ring-fenced for R&I during the previous programming period, with most of these channelled into development of research laboratories.

The Malta College of Arts, Science and Technology (MCAST) has become increasingly involved in research projects in recent years and is committed to increasing its level of research output. It has been most active in the Energy and Agricultural sectors and it has identified four focus areas for future activity (Manufacturing, Health & Tourism, Energy, Water & Agriculture, Education).

Government Sector

Malta has only one public research organisation, the Malta Aquaculture Research Centre, which accounts for most of the research expenditure in this sector. A number of government departments may be involved in research activities to a small extent, but do not have a dedicated research budget. In 2013 65% of government research employees were engaged in the agricultural sciences sector (NSO 2015).

Private Sector

In private enterprise, the importance of the manufacturing sector (NACE Code C) is declining with its share of R&D expenditure decreasing from 70% in 2008 to 39% in 2013. The biggest gains were registered by the Information and Communication sector (J), which increased from 26% to 48% over the same period (Eurostat Dec2015). It is estimated that approximately 86% of private sector research was undertaken by high-tech firms.

Looking into the situation with a finer lens, the sector with the highest R&D expenditure in 2013 was computer programming (J62) followed by the pharmaceuticals sector (C21), which together accounted for 55% of BERD. Figure 1.4 below shows the contribution of the different sectors to private sector research.

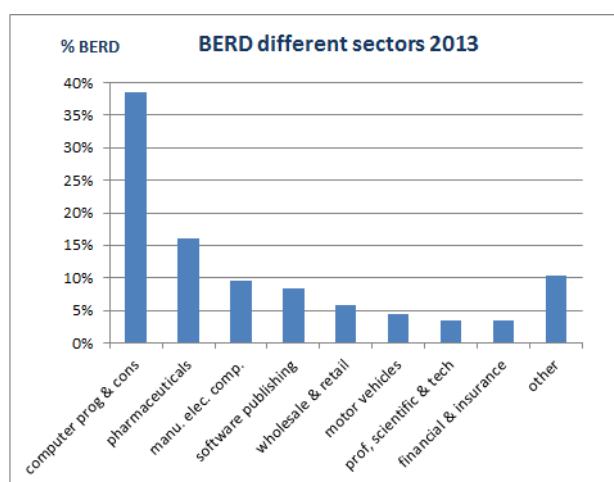


Figure 4 R&D expenditure of the different sectors as % of BERD in 2013 (Eurostat Dec 2015)

Most of the R&I activity in the private sector is performed by a small number of organisations. Table 4 shows the total number of organisations by employment class as well as the number of organisations undertaking R&D activities in the business sectors with the highest R&D expenditure (NSO 2014).

Table 4 Top R&D sectors contribution to BERD and number of organisations in 2012 (NSO)

Sector	% BERD 2013	% BERD 2012	Firms performing R&D 2012	Number of enterprises by employment size class 2012			
				micro 0 - 9	Small 10 - 49	Medium 50 - 249	Large 250 +
computer prog. & consultancy	38%	25%	21	1,567	32	6	0
pharmaceuticals	16%	27%	6	23	3	2	2
manufacturing of elec. components	10%	10%	5	43	4	4	1
software publishing	8%	9%	4	139	6	4	0
wholesale & retail trade	6%	6%	69	14,950	432	57	1
manufacturing of motor vehicles	5%	5%	?	23	0	0	1
professional, scientific & technical	3%	3%	52	4,720	62	17	3
financial & insurance	3%	3%	17	150	1	0	1

Other	10%	13%	39	39,075	885	281	71
Total				68,743	1,572	384	83

In Malta, microenterprises and SMEs accounted for 66% of BERD in 2012, which is the highest within the EU, while the contribution of large enterprises is one of the lowest (Eurostat, April 2013, Science, Technology & Innovation in Europe – 2013 Edition).

Table 5 R&D expenditure by organisation employment size class in 2012 (Eurostat Feb 2015)

Employment size class	0 – 9	10 - 49	50 - 249	250 +
Number of firms	68,743	1,572	384	83
R&D as % BERD	15.4%	28.8%	22.3%	33.6%

Information on the role of multinational corporations in the research landscape in Malta is not available. However, a 2012 report (PWC, April 2012) indicated the presence of over 200 multinational companies accounting for over 85% of Malta's industrial output. These multinationals operate in a number of sectors including healthcare, pharmaceuticals, high-precision engineering, ICT, online gaming and logistic-based services.

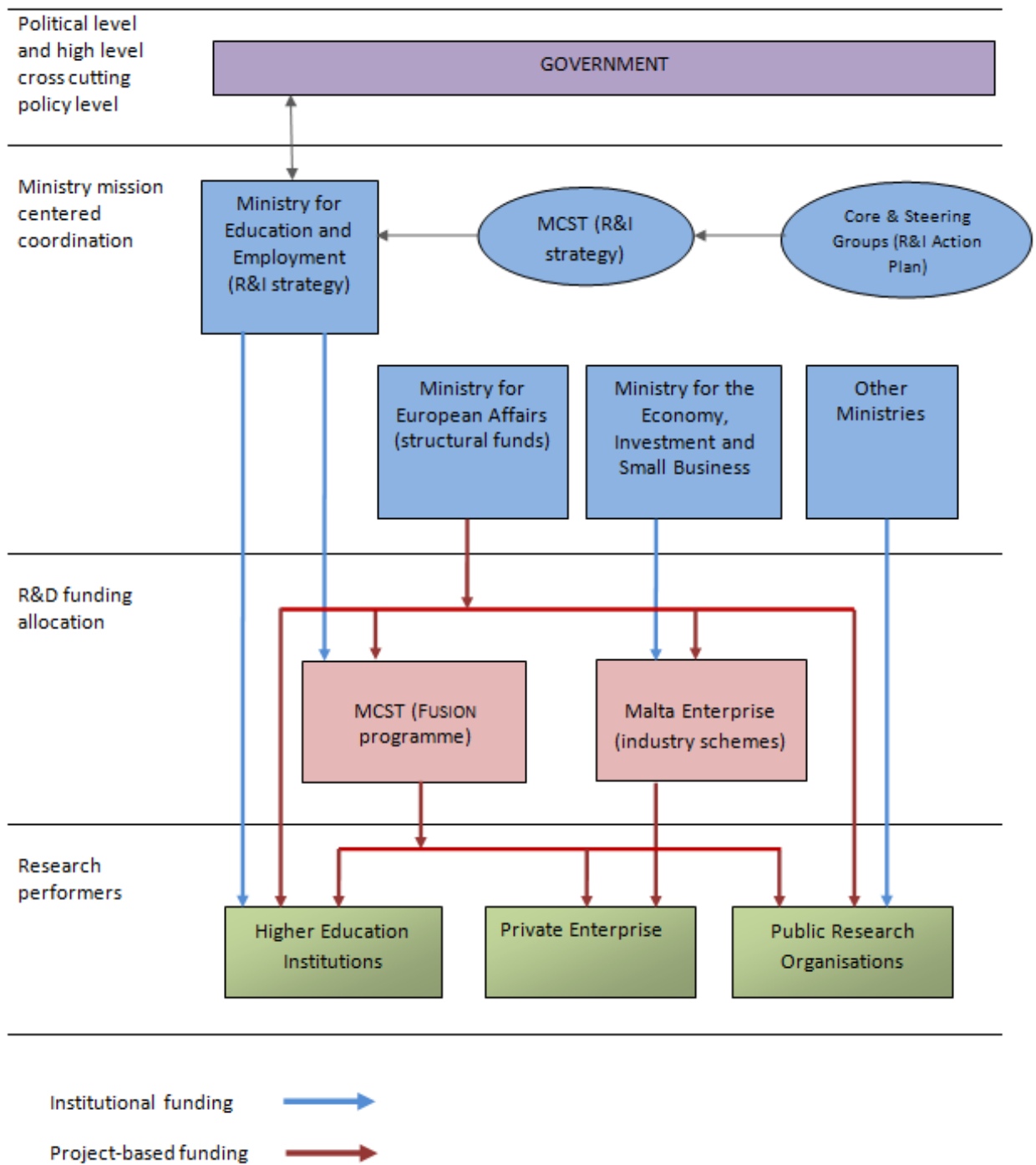


Figure 5 The Maltese R&I system

2. Recent Developments in R&I Policy and systems

2.1 National R&I strategy

R&I policy is guided by a multi-annual National R&I Strategy 2020 (MCST, June 2014) which was formally endorsed by the Cabinet of Ministers in February 2014.

The strategy follows an integrated approach and addresses research, innovation and smart specialisation in a single document. It has a broad scope and addresses a variety of topics such as international cooperation, human resources, finance and entrepreneurship.

The national strategy highlights three main goals as follows:

1. building a comprehensive R&I ecosystem;
2. developing a stronger knowledge base, and
3. Smart Specialisation.

The Smart Specialisation Strategy for Malta is an integral component of the national R&I strategy, and identified the following seven areas of specialisation:

- tourism product development;
- maritime services;
- aviation and aerospace;
- health, with a focus on healthy living, active ageing and e-health;
- resource-efficient buildings;
- high value-added manufacturing with a focus on process and design, and
- aquaculture.

In addition, ICT was identified both as a horizontal enabler across all identified specialisation areas, as well as a Smart Specialisation niche in itself. R&I opportunities in rural development were also highlighted.

The strategy was developed following an extensive open consultation exercise involving all relevant policy-makers and stakeholders, including academia and industry representatives. It also included a SWOT analysis although it appears that this was not an in-depth exercise and it is not clear how the results of the SWOT analysis tie in to the rest of the strategy document.

The strategy addresses research and innovation in an integrated fashion, covering academia, industry and human resources. It has a strong focus on close-to-market research and innovation, and as a result of this approach, frontier science and fundamental research is not adequately catered for.

As its name implies, the National R&I Strategy 2020 has a time horizon of 2020. Implementation of the strategy has not yet got underway since the approach which was followed was to prepare a succinct and high-level strategy document which would guide the preparation of a detailed action plan. In 2014 a Core Group and a Steering Group were set up to prepare the action plan and to oversee the implementation of the strategy. The Steering Group is a technical working group which includes representatives from industry, academia, government and civil society. Its aim is to prepare the action plan listing a number of policy measures, funding requirements and priorities. This will be submitted for endorsement to the Core Group which consists of high-level government officials from a number of ministries. The action plan has been submitted to the EC for endorsement but is not yet public.

The strategy also briefly mentions the desire to develop synergies between the use of European Structural and Investment Funds (ESIF) allocated to Malta, national funding and H2020. The strategy has a number of limitations and makes only passing reference to the European Research Area, cross-border cooperation and joint programming, but nevertheless expresses a commitment to achieve these European objectives.

Work is currently underway on the development of an ERA Roadmap and it is expected that this will be completed in 2016

The overarching strategy is complemented by a number of thematic research strategies which have been developed in recent years. These include the National Manufacturing Strategy (MCST, Dec 2012) and the Health Research and Innovation Strategy (MCST, 2013). Research in the field of ICT is touched upon in the national ICT strategy (Parliamentary Secretariat for Competitiveness and Economic Growth, March 2014) as well as in the digital gaming strategy (GamesAudit, Feb 2012).

2.2 R&I policy initiatives

The last three years have been quite dynamic in terms of R&I policy measures, with the launch of a number of initiatives for the first time. Due to delays in the finalisation of the national strategy and associated action plan, however, such initiatives were developed without the benefit of a proper guiding framework but these always conformed to the general strategic principles which were carried over from the previous strategy. However, with the finalisation of the new strategy in 2014 and the establishment of the core and steering group it is expected that a more coherent and integrated approach to policy development will ensue.

A new Commercialisation Programme was introduced in 2012, later rebranded as part of the Fusion Programme (<http://www.mcst.gov.mt/fusion-ri-programme>). This was the first time that such funding became available locally and the programme has attracted a high level of interest. Results of funded initiatives are not yet available but the programme has the potential to facilitate the development of marketable products.

Another important initiative in 2014 was the launch by the University of Malta of the Takeoff Business Incubator and Takeoff Seed Fund (<http://www.takeoff.org.mt>). Once again this was the first time that such facilities and funding became available in Malta. 2014 also saw the launch of the Entrepreneurship Centre run by the MCAST vocational college (<http://www.mcastentrepreneurship.com/about.php>).

In 2014 the Life Sciences Park (www.lifesciencepark.com) blueprint was modified to accommodate a Digital Hub within its complex. The Life Sciences Park is a state-of-the-art industrial park dedicated to the life sciences sector and estimated to cost around €30 million (Ministry of Finance, April 2012, pp 119). Both initiatives are scheduled for completion in 2015.

In May 2014 an ICT Innovation Hub was inaugurated at Smart City Malta (<http://mitainnovationhub.gov.mt>) and is being run by Malta Information Technology Agency (MITA), the government's IT agency. This initiative complements and supports existing incubators and innovation centres offering another alternative to students, start-up founders, innovators and ICT companies.

Recent years also saw the closure of a number of schemes funded through EU structural funds on account of the end of the programming period in 2013. This includes the STEPS postgraduate grant scheme, funding for the research infrastructure at the University of Malta, and a number of schemes promoting research and innovation in the private sector. However this is only a transitory situation and a number of new schemes are being devised or are already in operation, with funding once again sourced through structural funds. In April 2015 the 'Reach High' postdoctoral research grant scheme (<http://education.gov.mt/en/education/myScholarship/Pages/Reach-High-Scholarships.aspx>) was launched funded through the European structural funds (ESF programme). This marks the first time that funding for postdoctoral research became available in Malta, fulfilling a pressing need for funding at this level and opening up career prospects for doctoral graduates.

2.2.1 Evaluations, consultations, foresight exercises

Without a doubt the most significant consultation exercise in recent years was the development of the national strategy and smart specialisation strategy having a time horizon of 2020. The development process involved extensive stakeholder consultation with all relevant public sector entities as well as with academia, the private sector, private sector representatives and social partners. As part of the entrepreneurial discovery process, around 20 meetings with top government officials, public entities and social actors were held, supplemented by one-to-one meetings with a number of private sector stakeholders. This led to the identification of a number of broad thematic areas. Following this, focus group meetings with private stakeholders and meetings at political level were organised to discuss the identified areas in greater detail. The smart specialisation strategy which constituted part of the national strategy was submitted for peer review in June 2013 under the aegis of the JRC peer review workshops initiative prior to finalisation.

Other positive developments include the survey of participation in the COST programme (MCST, Oct 2014) and the review on participation in FP7 which also addressed the identification of barriers and remedial actions (MCST Jan 2015). The FP7 review included a questionnaire survey of local organisations interested in participating in FP7 / H2020 which revealed that support for participation in brokerage events abroad, for preparation of project proposals and more targeted support from the NCP organisation were the desired support measures.

Malta is also a partner in the FP7 MIRRIS project (Mobilising institutional reforms in research and innovation systems) which involves the review and analysis of research and innovation systems in the participating countries with the objective of improving their participation in EU programmes.

However, on the negative side there is no evidence of foresight exercises, surveys or intelligence gathering to improve the knowledge base for policy conceptualisation and design having been undertaken in recent years. In particular, intelligence regarding research and innovation in the private sector is sorely lacking. Neither the foremost business organisation (Malta Chamber of Commerce, Enterprise and Industry) nor the relevant public agencies (Malta Enterprise, MCST) have undertaken any detailed studies or published any reports on the subject. While the same is true regarding academic research, this is much less of an issue since there is only one organisation in this category (the University of Malta).

2.3 European Semester 2014 and 2015

The 2014 Country Specific Recommendations for Malta (EC, June 2014) do not include any actions relevant to R&I. The more recent European Semester Country Reports on Malta (EC, February 2015) addresses the topic and states that, in spite of significant R&I progress over the last few years, Malta still suffers in a number of areas and lists the following concerns:

- very low R&D intensity with limited public spending;
- a weak S&T human resource base;
- low levels of scientific excellence linked to the lack of critical mass in specific research areas, and;
- declining innovation-based business performance.

Malta's current National Reform Programme dated April 2015 (Ministry for Finance, April 2015) provides a brief account of a number of ongoing initiatives aimed at achieving Malta's target R&D expenditure of 2% of GDP by 2020. It does not make any reference to the European Semester Country Report or provide a rationale for the initiatives.

The initiatives currently underway listed in the main document include:

- the Fusion Programme (incorporating the Technology Development Programme and the Commercialisation Voucher Programme);
- the Life Sciences Centre;
- the National Interactive Science Centre;
- the MITA Innovation Hub, and
- the development of a rolling R&I Action Plan in support of the national strategy.

The first two measures have been underway for a number of years, while the third (National Interactive Science Centre) got underway in 2014. This is aimed at encouraging more individuals to opt for a career in science and its impact on the R&I ecosystem is indirect. The fourth measure, the MITA Innovation Hub, was launched in 2014 and while the concept is sound, its very limited budget (€30k in 2014) means that it will have a negligible effect on the R&I ecosystem. The fifth bullet is not a policy measure but a planning activity.

The NRP also mentions the launch of the 'Reach High' post-doctoral grant scheme, an important initiative which has been in the pipeline for a number of years and which has finally come to fruition.

The NRP annexes include an update on the plans for the development of a National Aerospace Centre which aims to provide support to the local aerospace industry and to showcase national capacity in aerospace technologies by focusing on high-profile research and innovation and international cooperation in this field.

2.4 National and Regional Research and Innovation Strategies on Smart Specialisation

Due to Malta's small size it had to go for a single Smart Specialisation Strategy with a national scope. This was finalised in 2014 and has been incorporated into the National R&I Strategy 2020. A number of areas of specialisation have been identified but no specific targets or lines of action have been set yet. These will become clear once the Action Plan is made public.

A technical steering group incorporating policymakers and key stakeholder representatives are working on the development of an action plan which will include tailored actions and initiatives for each area of specialisation based on an in-depth analysis covering legislation, standards, and issues of public perception and other factors which influence innovation potential. Funding plans will involve the utilisation of both national and EU funds (such as ESF, ERDF, the European Agricultural Fund for Rural Development – EAFRD, and the European Maritime and Fisheries Fund - EMFF) and EU public-public or public-private initiatives (e.g. Joint Technology Initiatives, Joint Programming Initiatives, etc.) to set up or strengthen nodes of activity to improve their innovation capabilities. The action plan has been submitted to the EC for endorsement but is not yet public.

With reference to the RIS3 monitoring mechanism, the national strategy specifies that such a mechanism will be established to review progress and ensure that the strategy is updated as necessary over time. Once the action plan has been finalised, the steering group will assume responsibility for monitoring its implementation and updating the action plan as necessary.

The Smart Specialisation Strategy does not specifically address R&I infrastructures. However, the national strategy specifies that future infrastructure priorities would be expected to conform to the smart specialisation areas, with health being specifically mentioned in the new ERDF operational programme (MEAIM, March 2015).

2.5 Main policy changes in the last five years

Main changes in 2011

Work commences on Life Sciences Centre.

Funding for National R&I Programme increased from €0.7m to €1.1m.

Main changes in 2012

Publication of National Manufacturing Strategy

Launching of Commercialisation Programme with budget of €0.2m.

Funding for National R&I Programme increased from €1.1m to €1.4m.

Main Changes in 2013

Appointment of Parliamentary Secretary for Research, Innovation, Youth and Sport.

Publication of Health Research and Innovation Strategy.

Main Changes in 2014

Publication of National R&I Strategy 2020 incorporating the Smart Specialisation Strategy.

Establishment of core group and steering group to oversee implementation of national strategy.

Rebranding of Fusion Programme incorporating Technology Development Programme and Commercialisation Programme.

University of Malta sets up Takeoff Business Incubator.

MCAST sets up Entrepreneurship Centre

Development work starts on National Interactive Science Centre.

Launch of ICT Innovation Hub at Smart City Malta.

Digital Hub added to Life Sciences Centre complex.

Main Changes in 2015

Launching of Reach High Postdoctoral Scholarship Scheme.

Launching of Endeavour Postgraduate Scholarship Scheme.

Launching of a number of schemes by Malta Enterprise.

3. Public and private funding of R&I and expenditure

3.1 Introduction

At just 0.85% of GDP in 2014, GERD in Malta equates to 0.42 of the EU average of 2.03% and Malta ranks 21st among the EU 28 (Eurostat Dec 2015).

The business enterprise sector (BES) is the largest R&D performer, accounting for 60% of GERD in 2014, while the higher education (HES) sector accounted for 31%, with the remaining 9% attributed to Government and public research organisations. Relative to the rest of the EU, Malta's strongest sector is higher education at 0.56 of the EU average, followed by the private sector at 0.39 and the government sector at 0.31 of the corresponding EU average figures.

Table 6 Basic indicators for R&D investments (2014)

Indicator	2011	2012	2013	2014	EU av
GERD (as % of GDP)	0.70%	0.86%	0.85%	0.85%	2.03%
GERD (Euro per capita)	115.1	147.9	152.5	158.3	558.4
GBAORD (€m)	14.56	19.96	21.51	19.10	92,828
GERD funded by BES (% GDP)	0.36%	0.39%	0.38%	0.42%	1.12% (2013)
GERD funded by GOV (% GDP)	0.20%	0.28%	0.28%	0.23%	0.66% (2013)
GERD funded by HES (% GDP)	0.01%	0.01%	0.01%	0.01%	0.02% (2013)
GERD funded by PNP (% GDP)	0.00%	0.00%	0.00%	0.00%	0.03% (2013)
GERD funded from abroad (% GDP)	0.12%	0.18%	0.18%	0.18%	0.20% (2013)
GERD performed by BES (% GDP)	0.46%	0.50%	0.47%	0.51%	1.30%
GERD performed by GOV (% GDP)	0.03%	0.07%	0.07%	0.08%	0.25%
GERD performed by HES (% GDP)	0.21%	0.29%	0.30%	0.26%	0.47%

R&D expenditure (GERD) increased steadily over the period 2009 to 2012 reaching a peak of 0.86% of GDP (€62.4m) (Eurostat Dec 2015). Figure 6 below shows that the increased spending on R&D during that period resulted from increases in all sectors. However, the positive trend was not maintained in 2013 and 2014 with some fluctuations in the BES and HES sectors.

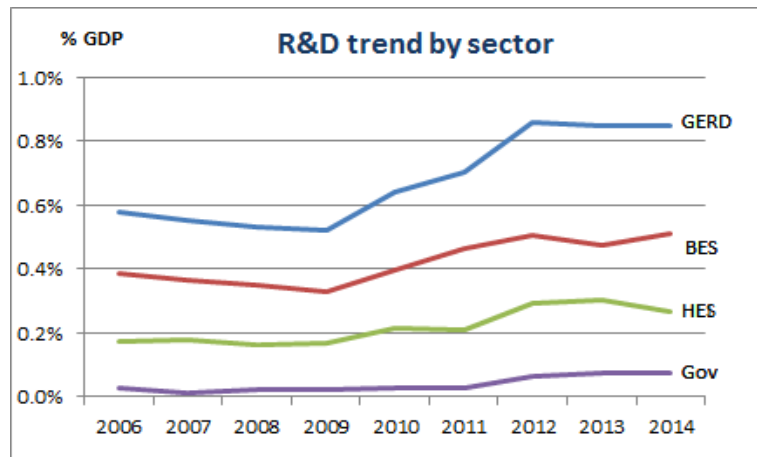


Figure 6 Research expenditure trends of different sectors as percentage of GDP (Eurostat)

Increases in national funding and use of structural funds for research infrastructure have been the key drivers behind the positive performance from 2009 to 2012. In terms of the type of expenditure, figure 7 below shows that expenditure on personnel has been increasing steadily, while investment in land and buildings (predominantly structural funds) stands out as a major contributor to increases since 2012.

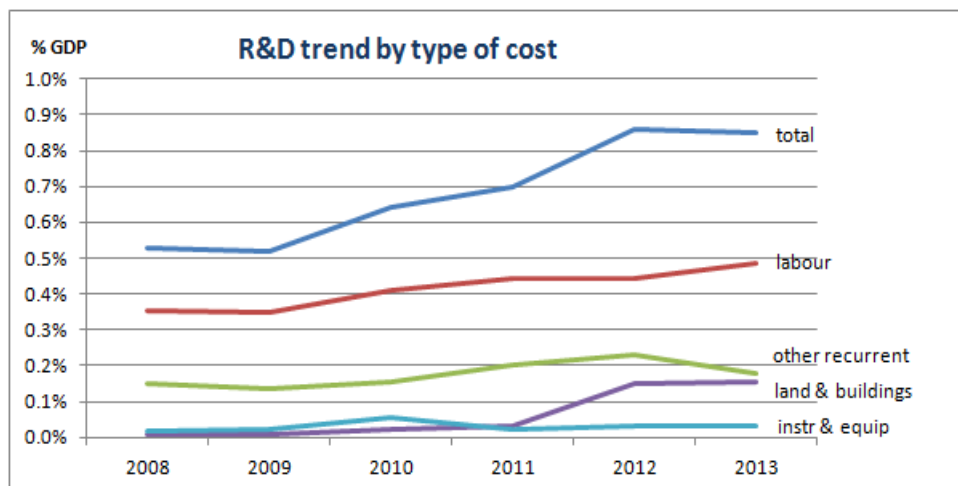


Figure 7 Research expenditure trends by type of cost as percentage of GDP (Eurostat)

The business enterprise sector showed strong growth until 2012, with expenditure increasing from 0.33% of GDP in 2009 to 0.50% (€36m) in 2012 and the number of R&D personnel (FTE) doubling over this period. In spite of this, its share of GERD has fallen during this timeframe as it was outstripped by growth in the public and higher educational R&D sectors which benefitted from a significant injection of structural funds. The closure of a key pharmaceutical R&D centre in Malta following acquisition by another company led to a decrease in BERD in 2013 (Times of Malta, March 2013).

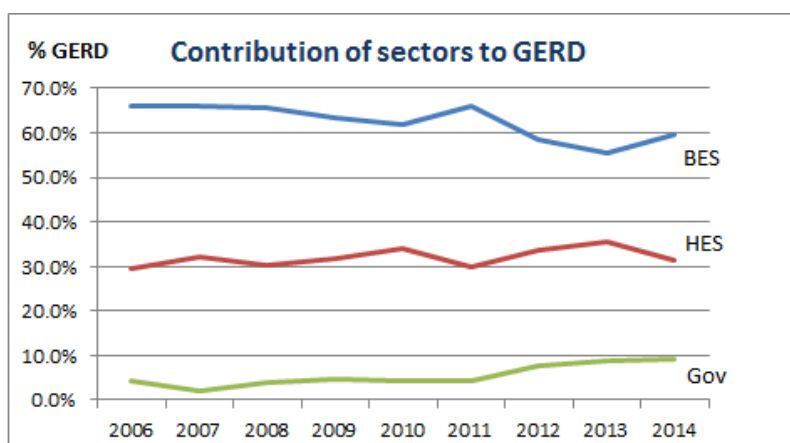


Figure 8 Contribution of different sectors to GERD (Eurostat)

In the higher education (HES) sector, research expenditure was €21m (31% of GERD) in 2014, more than twice that of 2009. The increase in overall expenditure was driven mainly by increases in personnel and infrastructure. The university has been one of the biggest beneficiaries of structural funds allocated to research, and a number of laboratories were constructed or upgraded in recent years. It is expected that the level of expenditure could taper off in 2015 following the completion of the current infrastructure projects, but will pick up again in the following years as new infrastructure projects come on steam.

R&D expenditure by government and public research organisations was 9% of GERD in 2014, one of the lowest in the EU. Even so, about 75% of this is attributed to expenditure related to the Life Sciences Centre and Digital Hub Life Sciences Centre (NSO 132/2014) funded through structural funds.

3.2 Smart fiscal consolidation

3.2.1 Economic growth, fiscal context⁸ and public R&D

Malta weathered the 2008-09 economic crisis with a moderate **GDP** loss of 2.5% and only once in 2009. This was preceded and followed by relatively strong investments (2010). For the 2011-2014 period, the external side of the economy became the main driver of growth as growth in exports outpaced the growth in imports. Economic activity peaked in 2015 after registering a growth rate of 6.3%, supported by strong investment growth and growth in private consumption on the back of strong wage growth and record-low unemployment. The economy is expected to continue expanding at healthy rates although less subdued than 2015. The European Commission in its 2016 Winter forecasts is expecting the Maltese economy to grow by 3.9% in 2016 and by 3.4% in 2017 with the domestic side of the economy expected to remain the key driver of growth. Private consumption is projected to become the main driver of growth over the forecast horizon supported by growing disposable income and favourable labour market conditions.

Malta's budgetary performance over the past decade was characterised by varying trends. The Maltese Government acknowledges the important role that National Fiscal Frameworks may play in sustaining budgetary retrenchment. In this regard, the Fiscal Responsibility Act, which was enacted by Parliament on the 8th of August 2014, outlines the main principles of fiscal responsibility and the objectives of fiscal policy. This Act establishes fiscal rules which bind national fiscal authorities in achieving a balanced structural budget, or in its absence, converge towards the medium-term budgetary objective.

⁸ Sources: DG ECFIN, National Reform Programme 2015, European Commission Economic Forecasts Winter 2016, RIO

The Act also establishes the Fiscal Council that is tasked with assessing and endorsing macroeconomic and fiscal forecasts, and securing compliance with fiscal rules according to the provisions of this Act. Moreover, the Act also establishes the medium-term budgetary framework and strengthens the role of the Ministry for Finance in the budgetary process and the multi-annual fiscal planning. It is to be noted that the Fiscal Council became operational in January 2015, following the appointment of the Chairperson and its members (National Reform Programme Malta 2015)

Results show that expenditures slippages occurred in the past years ,that were often followed by lower-than-planned public investments⁹. However, since 2012 the budget deficit is on a decreasing path and the European Commission in its 2016 Winter forecasts is expecting the budget deficit to remain under the Treaty threshold of 3% throughout the next two years (2016: 1.1%, 2017: 1.0%). The government debt ratio has risen continuously from the 2008 level of 62.7% of GDP to 68.5% of GDP in 2013¹⁰. It decreased in 2014 (66.9%) and 2015 (to 64%) due to strong economic growth and lower budget deficits. The Commission expects (DG ECFIN Winter Forecast) further decreases in 2016-17 reaching 58.7 % of GDP in 2017 thanks also to favourable nominal GDP growth. According to the Fiscal Sustainability Report 2015, published by the Commission in January 2016, Malta faces no sustainability risks in the short and medium term, nor risks emerging from a debt sustainability perspective. On the other hand, the long-term sustainability of Malta’s public finances face medium sustainability risks in the long term mainly due to population ageing, and to a lesser extent due to Malta’s high level of contingent liabilities.

Risks from insufficient tax compliance and tax evasion are also present. However, in 2014, the Government implemented several measures that sought to establish a fairer tax system, reduce tax evasion and enhance tax efficiency. Further initiatives by the Government are envisaged that will further help to reduce tax evasion and increase tax compliance in the future (National Reform Programme Malta 2015).

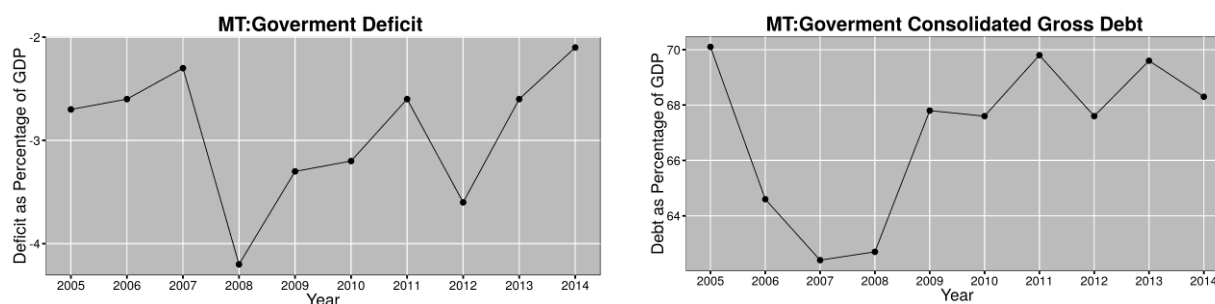


Figure 9 Government deficit and public debt
Data source: Eurostat

Total GERD in Malta was €64.2 million in 2013. There are four main sources of R&D funding: the business enterprise sector (€28.8 million), the government (€21.7 million) and foreign funding (€13.8 million). Direct funding from the government goes to R&D in business enterprises (€0.35 million), the government (€0.54 million) and the higher education sector (€20 million).

⁹ This was coupled with optimistic projections for economic growth and government revenue. In 2000-07 Malta had one of the highest forecast errors among EU countries (Country Report for Malta).

¹⁰ Partly due to a debt increasing stock-flow adjustment due to some tax arrears from Enemalta, the public energy utility corporation (Country Report for Malta)

Table 7 Key Maltese R&D Indicators

	2007	2009	2013
GBAORD, % of gov. exp.	0.34	0.37	0.67
GERD, % of GDP	0.55	0.52	0.85
out of which GERD to public, % of GDP	0.19	0.19	0.39
Funding from GOV to, % of GDP			
Business	0	0	0.01
Public (GOV+HES)	0.14	0.16	0.27
Total	0.14	0.16	0.29
EU funding, % of GDP	0.04	0.02	n.a.

Source: Eurostat

3.2.2 Direct funding of R&D activities

The sources of R&D funding according to the Frascati manual are: Government sector (GOV), Higher education sector (HES), Private non-profit sector (PNP) and Abroad (including EC). In this analysis the public sector as source of funds is given by the GOV part of the total intramural R&D expenditure (GERD), whereas the public sector as a sector of performance is the aggregation of GOV and HES. Figure 10, below shows the historical evolution of GERD financing in current prices in Malta.

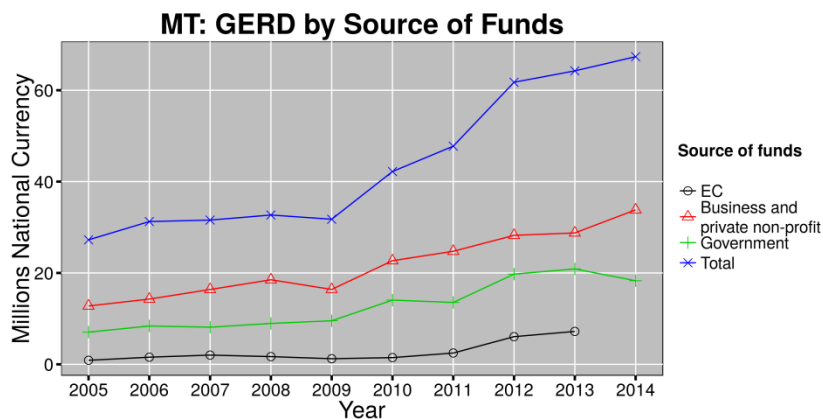


Figure 10 Development of government funding of the total GERD
Data source: Eurostat

Figure 10 shows that the total R&D expenditure (GERD) in nominal terms was practically unaffected by the crisis and is on a steady growth path ever since. In 2009-12 GERD has more than doubled. This remarkable growth has been driven mainly by the increase of funding from the government, which has practically doubled in this period. However, provisional data for 2014 indicates a drop in the direct public funding. Growth of funding from private resources (businesses and private non-profit) was also very significant in the same period. EU funding increased the most in 2012, which has thus become the year of the largest post-crisis growth of the Maltese GERD.

3.2.2.1 Direct public funding from the government

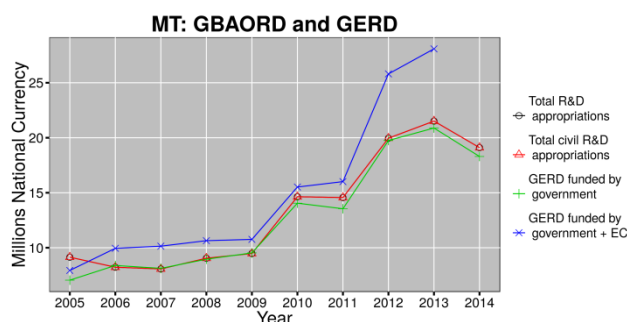


Figure 11 R&D appropriations and government funded GERD in millions of national currency

Data source: Eurostat

Based on Figure 11 allows for three key observations. First, based on the upper-right panel one can argue that both R&D appropriations (GBAORD) and government funded GERD are rather low (0.20-0.25% of GDP), one of the lowest in the EU. Second, one notices a strong similarity in the development of the indicators: since 2007 both GBAORD and government funded GERD follow an increasing trend resulting in post-crisis values that are significantly higher than their crisis / pre-crisis counterparts. Finally, in 2011 there was a small halt in the increasing trend of both indicators due on the one hand to a more important fiscal adjustment has taken place both nominally (Figure 9) and in structural terms (Figure 12), and on the other hand to the lag between the expiration of the National Strategic R&I Plan covering the years 2007-2010 and the new Strategy¹¹. In 2012 there was a sharp increase both in GBAORD and government funded GERD due to higher outlays mainly on investments in R&D facilities, including the Life Sciences Centre, classified within the Government sector (€9.7 million)¹². This trend continued in 2013, but provisional data for 2014 indicates a decrease in the level of both indicators.

¹¹ According to Research and Development in Malta 2009-2011 the R&D system recorded "lower outlays on capital expenditure by €2.1 million (...) mainly for the Higher Education sector. This was due to a large investment in 2010 by the University of Malta in instruments and equipment and in land and buildings, mainly financed through EU funds, which was not repeated in 2011", https://nso.gov.mt/en/News_Releases/Archived_News_Releases/Documents/2013/news2013_149.pdf

¹² Research and Development in Malta: 2010-2012, https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_A2/Public_Finance/Documents/2014/News2014_132.pdf

3.2.2.2 Direct public funding from abroad

Table 8 Public Funding from Abroad to the Maltese R&D (in millions of national currency)

Source from abroad	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	7.32	8.58	7.07	5.22	5.84	4.95	8.49	12.97	13.77	14.47
BES	5.37	6.25	4.20	3.02	3.78	3.07	5.61	6.12	5.76	
EC	0.88	1.56	2.02	1.69	1.23	1.47	2.47	6.05	7.20	
GOV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HES	0.62	0.64	0.48	0.11	0.24	0.09	0.12	0.28	0.29	
International Organizations	0.44	0.07	0.38	0.37	0.56	0.28	0.25	0.51	0.52	
Total as % GERD	26.86	27.47	22.40	15.97	18.37	11.73	17.77	21.00	21.43	21.49
EC as % GOVERD	12.54	18.60	24.83	18.81	12.88	10.45	18.24	30.65	34.48	

Table 8 reveals that external funding was relatively volatile throughout 2005-13 varying between 16-27.5% of GERD (€5-13.3 million) without a clear-cut trend. Businesses were historically the main external source of financing. However, EU funding has recently jumped to almost 32% of GERD funded by government. Other external sources (international organisations, foreign governments or HES, etc) were of marginal importance.

Based on data from DG REGIO, the total Structural Funds for the period 2007-2013 for Malta amounted to €840 million of which €55 million is dedicated to 'Core' R&D activities. As a share of the total Structural Funds for the country Malta is the 23rd among the EU28.

3.2.3 Indirect funding – tax incentives and foregone tax revenues

Malta Enterprise, the main funding agency for private R&D investment, was operating the R&D Tax Credits scheme. Projects under the scheme may receive tax credits on wages of research staff, depreciation costs of instruments and equipment, costs of material, supplies and similar products directly related to the project, subcontracted research and costs of technical knowledge and patents.

The tax credit percentage is related to the size of the enterprise. Additionally bonuses are provided to enterprise participating in collaborative projects with other industry partners or research organisations¹³. The maximum levels of assistance that may be provided under this incentive can be found in Annex 4.

¹³ <http://www.maltaenterprise.com/en/support/experimental-development-tax-credits>

According to information provided to ERAC, R&D tax incentives have a minor role (2011: €0.37 million, 2012: €0.58 million). This conclusion is in line with statements of Maltese experts saying that: "Indirect funding in the form of a tax incentive scheme has been in place for a number of years, but it is believed that this has not been effective and there have been few beneficiaries to date."¹⁴

3.2.4 Fiscal consolidation and R&D

Figure 12, below shows the scatterplot of the structural balance and GBAORD as % GDP, first panel as well as GERD as % GDP, second panel,¹⁵: None of the plots demonstrates a linear relationship between the variables.

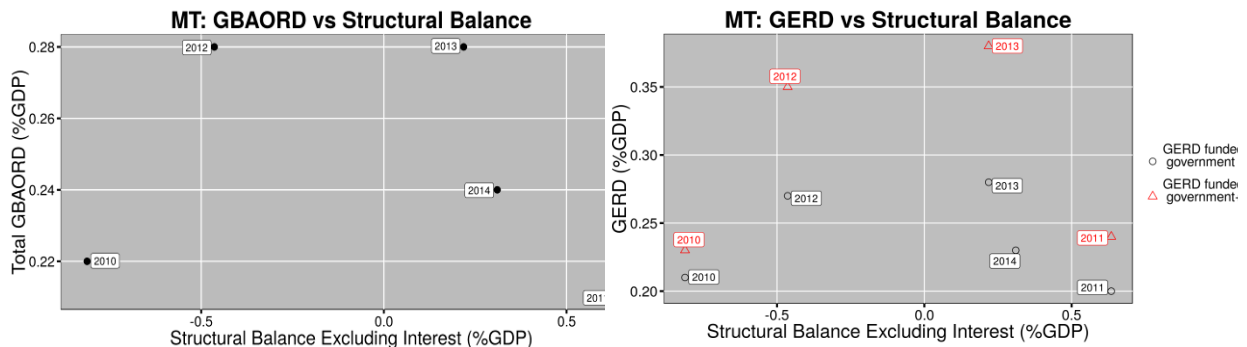


Figure 12 Fiscal consolidation and R&D
Data source: AMECO, Eurostat

In the post-crisis period, there is an improvement in the "primary" structural budget balance (Figure 12). Meanwhile both GBAORD and government financed GERD increased or at least they were safeguarded but never fell back to their crisis or pre-crisis level (see also Figure 11). Therefore, the post-crisis fiscal consolidation did not have a negative impact on direct public support to R&D. Adding indirect funding through R&D tax incentives would further improve the picture. However, the quality of this data is not sufficiently good in order to be able to take it into account in the analysis¹⁶. On the contrary Figure 12 (right), clearly shows that EU funding became more significant from 2012 onwards.

An economic assessment of Malta's fiscal framework with the objective of strengthening this framework was published in 2013 (Ministry for Finance, April 2013) but did not make any specific reference to the public expenditure on research and innovation. In fact, there appears to be no explicit mention of smart fiscal consolidation in any policy documents. Nevertheless, the country has followed the principles of smart fiscal consolidation since there have not been any reductions in public funding for research and innovation in recent years except from 2014. On the contrary, recent years have been marked by substantial increases in both national funding as well as funding from EU structural funds.

¹⁴ ERAWATCH Country Reports 2013: Malta

¹⁵ Structural balance data comes from the AMECO database the other indicators were taken from Eurostat and OECD.

¹⁶ There is no official data on the levels of the tax incentives in Malta. Information provided to ERAC and experts opinion (Deloitte) show that R&D tax incentives do not play a prominent role in Malta (see also Section 3).

3.3 Funding Flows

3.3.1 Research funders

The main public bodies responsible for disbursing research funds are the following:

Ministry for Education and Employment

The ministry provides funding to the University of Malta on the basis of a block vote which amounted to €59m in 2014 (Ministry for Finance, Oct 2015) . Of this approximately €0.7m is utilised as dedicated research funding and disbursed by the university on a project-based competitive basis (Bartolo A., July 2011). However, when accounting for the time academic staff spent on research it is estimated that approximately €16.5m of University funds were utilised for research activity in 2014 (Eurostat, Dec 2015).

The Ministry for Education is also responsible for managing the *Endeavour* postgraduate grant scheme and the *Reach High* post-doctoral grant scheme which were launched in 2015.

Ministry for Sustainable Development, the Environment and Climate Change

The ministry funds the operational costs of the Malta Aquaculture Research Centre, which does not have its own budget line. Relevant costs were in the region of €0.5m in 2014 (Eurostat, Dec 2015).

Malta Council for Science and Technology (MCST)

The MCST manages the FUSION Programme which incorporates the Technology Development Programme and the Commercialisation Programme with a combined annual budget in the region of €1.6m. This is project-based funding and is disbursed on a competitive basis following an open call. The programmes are open to academia, industry, PROs and NGOs. The MCST only disburses national funds since it is not an authorised intermediary body and is therefore unable to operate schemes funded through Structural Funds.

Malta Enterprise

Malta Enterprise manages a number of schemes targeted at industry and utilises national funds, including tax credit schemes. Funding is allocated on a competitive project basis.

Parliamentary Secretariat for EU Funds within the Ministry for European Affairs

This is responsible for administration of EU Structural and Investment Funds. For the 2014-2020 programming period, there is an allocation of €57.7 from ERDF and €15.1 from EAFRD for R&I. If the national contribution is taken into account, these equate to €72.1m and €20.2m respectively, or about €13.2m annually (EC ESIF portal).

The structure of the funding system is summarised in the table below:

Table 9 Summary of research funding bodies

Funding body	Source funds	of	Beneficiaries	Funding basis
Ministry for Education	National		University of Malta	Institutional block vote
Ministry for Sustainable Development	National		Malta Aquaculture Research Centre	Institutional
MCST	National		All	Competitive, project-based
Malta Enterprise	National / structural funds		Private enterprise	Competitive, project-based
Parliamentary Secretariat for EU Funds	Structural funds		Academia, public sector	Competitive, project-based

While Malta does not have any NGOs with a focus on funding research, there exist a number of independent charitable organisations working in the health arena which provide assistance to patients and their families and occasionally contribute funds towards R&D. In 2011 the University of Malta received a donation of €0.5m from the government as seed funding for setting up a Research and Innovation Development Trust (RIDT), which has been strongly promoting the concept of non-governmental funding both with industry as well as with civil society. The RIDT has registered some success with existing charitable organisations to secure funding for health research projects. Funding has been obtained from the Community Chest Fund (osteoporosis research), Lifecycle Malta Foundation (for kidney research) and from the Alive Charity Foundation (breast cancer research). Despite the fact that the amounts collected are still rather low at approximately €0.5m in 2015 (University of Malta 2015), they constitute a significant contribution in relation to the level of discretionary research funding available at the University of Malta.

3.3.2 Funding sources and funding flows

Public R&D Funding

Annual data regarding the amounts of R&I funding originating from the EU framework programme and from EU structural funds is not readily available. However, indicative figures have been compiled by the author using a combination of Eurostat and other data as explained in Annex 6 and are displayed in the figure below.

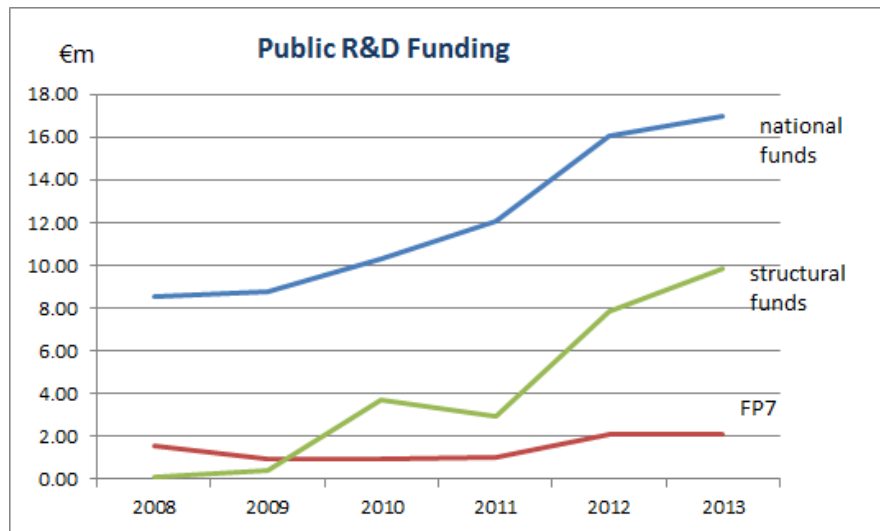


Figure 13 Public research funding (analysis based on Eurostat data)

National R&D Funding

National funding has increased sharply in recent years, practically doubling over the period 2008 – 2014 to the tune of €18.6m equivalent to 74% of total public funding. This consists primarily of institutional funding to the University of Malta (€16.5m in 2014), and to a lesser extent the competitive project-based Fusion Programme (€1.6m in 2014). Its share of the funding mix has decreased in recent years due to the increasing volume of structural funds channelled into R&D in recent years.

FP7 Funding

Maltese organisations were allocated a total of about €21.2m from FP7 over its lifetime¹⁷). However, not all of this qualifies as R&D funding since many of the projects were coordination and support actions. Funding from FP7 varies from year to year and generally accounts for between 9% and 16% of total public funding. It is estimated that in 2013 R&D funding coming from FP7 was in the region of €2.1m.

The University of Malta is the major beneficiary of such funds and FP7 provided a welcome source of research funding at this institution, supplementing limited national funds. However, the private and government sectors also participated actively in FP7 and obtained significant levels of funding.

Structural and Investment Funds

In recent years EU structural funds have assumed increasing importance in terms of contribution to public funding, rising from nil in 2008 to about €10m (34% of total public funds) in 2013. It is expected that this will fall sharply in 2015 as projects funded under the 2007-2013 programming period draw to a close, but will pick up again in the following years as new projects get underway.

Structural funds were used successfully for a range of R&I objectives, but primarily for infrastructure development. They were not used for developing public research organisations or for funding academic research activities.

¹⁷ Data provided by EC DG RTD

The utilisation of structural funds is summarised below:

- research infrastructure initiatives (at the University of Malta and also for national infrastructure);
- aid schemes for promoting R&I in industry;
- developing human resources (STEPS postgraduate scholarship scheme);
- promoting entrepreneurship and technology transfer.

Funding allocations for infrastructure projects and human resource development were fully taken up, although this was not the case with the industry R&D scheme. This had an initial allocation of about €3.5m of which only about 65% was utilised, with the balance being diverted to other R&I initiatives. The reasons for the limited success of this initiative are not clear.

The initiative regarding entrepreneurship and technology transfer was taken by the University of Malta and focused primarily on training activities, and did not include direct funding for technology transfer activities.

Under the new programming period, the Operational Programmes for the ERDF and ESF programmes were finalised in March 2015. However, only 9% of structural funds will be allocated to R&I compared to an EU average of 12%¹⁸. Planned interventions include national infrastructure, infrastructure in the higher education sector, and promotion of R&I in private enterprise (both SMEs as well as large enterprises) (MEAIM, March 2015). New schemes have already been launched for postgraduate scholarships and post-doctoral grants.

Private R&D funding

Private sector funding from local sources has been increasing in recent years, while that coming from overseas also showed a generally positive trend but fluctuates somewhat. In 2013 less than 14% of business funding came from overseas (Eurostat, Dec 2015). The decrease in overseas funding in 2013 is probably related to the closure of a key pharmaceutical R&D centre in Malta following acquisition by another company (Times of Malta, March 2013).

Private sector funding is used mainly intramurally, with only marginal amounts being used for outsourcing research to HEIs or PROs estimated at 1% of such funding in 2013 (Eurostat, Dec 2015).

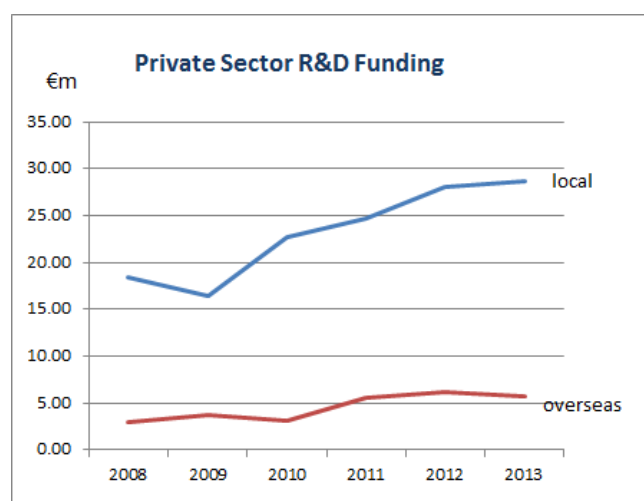


Figure 14 Private research funding (analysis using Eurostat data)

¹⁸ Data provided by EC DG RTD

3.4 Public funding for public R&I

3.4.1 Project vs. institutional allocation of public funding

With reference to national government funding, it is estimated that in 2014 approximately 9% of this was allocated on a competitive basis, with the share of such funding not varying significantly in recent years. With reference to public funding which includes both national and structural funds (which are allocated on a competitive basis), the share of competitive funding rises to 32% in 2014.

The main mechanisms used to disburse national funds are the following:

Institutional funding: University of Malta funds allocated by government (€16.5m in 2014);

Project funding: primarily the MCST Fusion Programme (€1.6m in 2014).

There has been no discussion regarding the optimal mix of institutional vs project-based funding either in the national strategy or in any other forum. Allocation of public funds for R&I is not governed at a legislative level but rather at an administrative one, and if necessary changes could be implemented with relative ease. With reference to EU structural funds, the opposite is the case with virtually all funding allocated on a competitive basis.

3.4.2 Institutional funding

The Maltese funding system does not make use of institutional assessments as a basis for determination of the level of funding. Performance assessments of educational and government institutions is not undertaken. Institutional funding is determined primarily on the basis of the financial allocation of previous years, together with any approved changes. There are presently no plans to change the current state of affairs.

3.4.3 Project funding

National funding for R&I projects is very limited, and there are no programmes specifically targeting academic research or public research organisations. National funding for research infrastructures is non-existent, although such funding is available through EU Structural Funds. The main public programmes offering project-based funding for research and innovation to the public sector are as follows:

Fusion Programme. This is financed through national funds and is managed by the Malta Council for Science and Technology. It is not targeted exclusively at public R&I but funds projects undertaken by consortia involving both industry and academia. The key objective of the programme is to fund activities which will lead to the development of commercial products or services. It operates on a competitive basis following an open call for proposals, and funds projects in the smart specialisation areas identified in the National R&I Strategy 2020. It incorporates the following sub-programmes:

The **Commercialisation Voucher Programme.** Any organisation wishing to participate in the Fusion Programme must first submit an idea to the Commercialisation Voucher Programme. This funds a number of activities (e.g. market research, product development costing, risk profiling, IP check, initial patent registration, etc.) in order to assess the idea for its commercialisation potential prior to undertaking any research and development work. The regulations do not specify the evaluation criteria but the structure of the proposal template implies the use of three such criteria (excellence, impact and implementation). Similarly the regulations do not specify the constitution of the evaluation board.

Technology Development Programme. Once an applicant has progressed through the Commercialisation Voucher Programme and had a successful outcome, an application may be submitted under the Technology Development Programme. This will provide funding for the actual R&D work hopefully leading to the development of a marketable product.

Evaluation criteria include alignment with the programme objectives, quality of the project plan, strength of consortium, project outputs, dissemination and budget. The regulations do not provide details of the constitution of the evaluation board.

ERDF Financing. The ERDF operational programme 2014-2020 specifies an allocation of €72.2 (including national contribution) for R&I, of which approximately 64% is targeted at the public sector for the development of national infrastructure (MEAIM, March 2015). Projects are selected on the basis of an open call, with the selection conducted on the basis of nine selection criteria including the proposal's contribution to smart specialisation areas, development needs, expected results, sustainability, readiness, organisational capacity, application quality and horizontal priorities.

The evaluation process follows many of the international peer review principles such as excellence, impartiality, confidentiality, integrity, etc. However, the programme regulations do not specify the composition of the selection committee or the qualifications necessary for eligibility to perform this role, and the evaluation team does not include any international reviewers. A single evaluation committee is responsible for evaluation of proposals on a diversity of themes ranging from R&I to environment to transport. *Ad hoc* experts may be invited to support the deliberations of the committee, but it is not clear how often this possibility is availed of.

While no information is available regarding the success rate, this is believed to be very high since the number of beneficiaries is very limited due to the centralised R&I governance system.

Reach High Post-doctoral Grant Scheme managed by the Ministry for Education and funded through EU Structural Funds (ESF). This scheme provides grants of up to €200k to doctoral graduates to undertake research projects in a higher educational institution, either in Malta or overseas. The scheme has a financial allocation of €2m. It funds post-doctoral research projects undertaken by an individual applicant. It operates on a competitive basis following an open call for applications, and funds projects in a number of areas based on the smart specialisation areas identified in the National R&I Strategy 2020 as well as national priorities. Evaluation criteria are specified in the relevant regulations and include merit of the applicant, relation to programme priorities, relevance to local economy and EU 2020 strategy, impact, presentation and outputs. The constitution of the project selection board is not specified.

Endeavour Postgraduate Grant Scheme managed by the Ministry for Education and funded through EU Structural Funds (ESF). This scheme provides grants of about €10k p.a. to graduates to undertake doctoral studies in a higher educational institution, either in Malta or overseas. The scheme has an annual financial allocation of about €1m. It operates on a competitive basis following an open call for applications, and funds projects in a number of national priority areas. Evaluation criteria are specified in the relevant regulations and include academic merit of the applicant, relation to programme priorities, relevance to local economy, likely impact to development of Malta, and previous work experience. The constitution of the project selection board is not specified.

Table 10 Public funding schemes for R&I.

Programme	Managing Organisation	Source of funds	Annual allocation	Funded activities	Comment
Fusion Programme	MCST	National	€1.6m	R&I	Funds both industry & academia
ERDF	Parliamentary secretariat for EU Funds	ESIF	€10m	R&I	€72.1m for the 7-year programming period 2014-2020
EAFRD	Parliamentary secretariat for EU Funds	ESIF	€2.9m	R&I	€20.2m for the 7-year programming period 2014-2020
Reach High Postdoctoral Grant Scheme	Ministry for Education	ESIF	€2m	Post-doctoral research	
Endeavour	Ministry for Education	ESIF	€1m	Postgraduate studies	€7m for the 7-year programming period 2014-2020

3.4.4 Other allocation mechanisms

Other mechanisms such as public procurement of R&D services are not commonplace in Malta. One of the few such examples was the MCST Manufacturing Research Project which came to a close in 2013, which involved outsourcing of manufacturing research to performers from university and from the private sector.

3.5 Public funding for private R&I

3.5.1 Direct funding for private R&I

National funding for private R&D is one of the lowest in the EU, standing at just 0.01% of GDP compared to an EU average of 0.09% in 2012 (Eurostat, Dec 2015). The business enterprise sector in Malta typically obtains less than 2% of its R&D expenditure from local public funds (Eurostat, Dec 2015).

The main research and innovation funding programmes targeting the private sector are the following:

Fusion Programme managed by the Malta Council for Science and Technology, which is open to both public as well as private entities. The details of this scheme were provided in the previous section.

Research and Development 2014-2020 scheme managed by Malta Enterprise. This is a hybrid scheme utilising both national funds as well as tax credits. It targets private enterprises that carry out Industrial Research or Experimental Development. Cash grants are available to entities registered in Malta which are partners in proposals selected for funding under the Eureka and Eurostars programmes. Other R&D projects are eligible for tax credits but may also be eligible for cash grants if a project is deemed by Malta Enterprise as having the potential to increase employment or economic growth in Malta. (http://www.maltaenterprise.com/sites/default/files/support_measures/rd_2014-2020_version_1_post_samb_clarifications.pdf) No details are available regarding priority setting, selection criteria and evaluation mechanisms.

R&D Feasibility Studies 2014-2020 scheme managed by Malta Enterprise. This provides cash grants of up to €50k which support undertakings intending to undertake Industrial Research and Experimental Development projects in carrying out R&D Feasibility Studies in preparation for these projects, and includes grants covering personnel as well as acquisition of knowledge expenses. (http://www.maltaenterprise.com/sites/default/files/support_measures/guidelines_version_1_post_samb_clarifications.pdf).

TAKEOFF Seed Fund Award. The TAKEOFF Seed Fund Award was launched in 2014 and is a joint initiative between the Ministry for the Economy, Industry and Small Business and the University of Malta.. It is based on a government allocation of €100,000 per annum, which is used to award grants of up to €20,000 to the University's TAKEOFF BUSINESS Incubator tenants for early-stage technology and start-up development, and to University academics as proof of concept funds. Evaluation of proposals is based on the following criteria:

- The market opportunity of the proposed technology or business plan;
- The potential and feasibility of the proposed technology or business plan;
- The capability of the researcher/entrepreneur/team to execute the proposed plan;
- The extent of the step-change that will be achieved through the funding;
- The likelihood that the requested funds will achieve the proposed outcome.

European Regional Development Fund (ERDF). The ERDF operational programme 2014-2020 specifies an allocation of €72.1 (including national contribution) for R&I of which approximately €26.3 is targeted at the private sector (MEAIM, March 2015). It is likely that this funding will be disbursed through aid schemes operated by Malta Enterprise as was the case in the previous programming period. Selection procedures have not yet been finalised but the operational programme lists proposed criteria such as quality of the proposal, project costs, leverage through use of EU funds, integration of horizontal principles, organisational capacity and degree of readiness to undertake the proposed work.

European Agricultural Fund for Rural Development (EAFRD). The EAFRD operational programme 2014-2020 specifies an allocation of €20.2 (including national contribution) for R&I (EC ESIF portal). No details are yet available regarding priority setting, the selection process or selection criteria.

The FUSION Programme can in principle cover the entire R&DI process from fundamental research to market innovation, although the emphasis is clearly on downstream activity and it may be difficult to exploit the fund to finance fundamental research. The other schemes target industrial research and product/service development and do not fund fundamental research. The FUSION Programme also stimulates public-private cooperation through the Technology Development Programme which requires participation of both types of organisation in funded projects. In the other schemes, funding is limited to the private sector.

Innovative financing solutions such as public-private partnerships are not available and have not even been explored. There have not been any initiatives aimed at establishing partnerships between local agencies and the EC on EU R&I programmes.

Schemes financed through national funds do not carry a high administrative burden, although there are no special provisions for SMEs as compared to large enterprises. On the other hand, beneficiaries of schemes financed through ERDF structural funds complained of onerous requirements in the preparation of financial claims (reference to S2E country report due to be published soon <http://s3platform.jrc.ec.europa.eu>).

Funding for start-ups has always been a problem in Malta although matters have improved with the launch of the TAKEOFF Seed Fund in 2014, albeit with a relatively small allocation of just €0.1.

Other schemes such as the MCA TAKEOFF Award and the MITA Innovation Hub (both focusing on the ICT sector) have even smaller budgets but nevertheless are a welcome addition to the policy mix given the general lack of funding.

There is no evidence that funding schemes are evaluated, especially regarding benchmarking against comparable schemes in other countries.

3.5.2 Public Procurement of Innovative solutions

The Department of Contracts (Ministry of Finance) is collecting all relevant statistical information related to public procurement. According to the annual report, the total public procurement for services, supplies and works in Malta in 2015 amounted to €201.6m (compared to €291.5m in 2013).

Table 11 Cost of contracts awarded by type of objects of public procurement

Year	Services		Supplies		Works		Annual Totals	
	Value(€)	No of Awards	Value(€)	No of Awards	Value(€)	No of Awards	Value(€)	No of Awards
2013	31,615,000.00	48	72,243,000.00	112	187,647,000.00	49	291,505,000.00	209
2014	11,488,000.00	27	46,952,000.00	197	120,622,000.00	125	179,062,000.00	349
2015	59,815,000.00	35	97,330,000.00	233	44,446,000.00	148	201,591,000.00	416

Legal Public Procurement framework¹⁹

The two 2004 Directives on public procurement (2004/17/CE and 2004/18/CE), which include some exemptions for R&D services (cf. *art. 16 Dir 2004/18/CE and art. 24 Dir. 2004/17/CE*), were transposed by means of CAP 174 Legal notices (LN) 177 and 178 (art.24, (e)) in 2005. LN 177 has been updated by LN 296/2010 as amended by Legal Notices 47, 104, 255 and 312 of 2012, 65 and 397 of 2013, and 55 of 2014 (cf. *art. 17 (1), (k)*, stating the law shall not apply to: "... public service contracts for research and development services other than those where benefits accrue exclusively to the contracting authority for its use in the conduct of its own affairs, on condition that the service provided is wholly remunerated by the contracting authority").

¹⁹ <http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=9532&l=1>

The Department of Contracts is in the process of concluding the transposition of the three new Public Procurement Directives which are:

2014/23/EU – Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts;

2014/24/EU - Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC;

2014/25/EU - Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC.

It is planned that these new Regulations will come into effect as of 18 April 2016.

PCP/PPI landscape

Malta doesn't have a stable scheme for PCP, but rather some examples of activities in the field. What could be regarded as such is the Malta Council for Science and Technology (MCST)

There is not specific national target for PCP and PPI allocation yet, but the Draft National Research and Innovation Action Plan 2020 aims *"to further support and entice public entities to demand innovation in their procurement procedures, with a particular focus on procurement related to the smart specialisation areas"*. Concrete measures are expected in the second half of 2017 but the budget allocations are not clear yet²⁰.

There was mentioning of R&D and innovation public procurement in the previous version of the National Strategic Plan for Research and Innovation for 2007-2010 (MCST); in order to promote PPI/PCP among contracting authorities in Malta, a series of workshops was organised. Also, in the new Strategy for R&I 2020²¹ (p.16), PPI and is considered to be a major driver for the economy and innovation: *"Embedding a culture for innovation, creativity, risk taking and entrepreneurship: A major driver of innovation is the local demand for and appreciation of innovative products, processes and services. A number of activities to instil a national culture for innovation have been introduced in recent years. However there are still areas of the economy which could benefit from innovative products, processes and services. There needs to be a stronger awareness at all levels, in government, business and society, of the role of innovation in improving the quality of life and competitiveness, thereby generating increased demand for innovation, particularly through public procurement."*

PCP/PPI initiatives

No national target (yet), but several good examples for PPI calls could be mentioned studied within the ERA-PRISM project (Policies for Research and Innovation in Small Member States to Advance the European Research Area²²):

Active Data Centre – set of business requirements were stipulated to increase the potential innovativeness of this project and as result the product performed as well as expected and was more efficient than the one it replaced. The procurement procedure was conducted on behalf of Malta Information Technology Agency (MITA)

Hospital Catering – the procurement was conducted on behalf of the Foundation for Medical Services. This is the first time a competitive dialogue procedure was used and the solution procured is considered to be high quality and cost-efficient.

²⁰ Please, note that the Action Plan is not yet finalised and it is has not been made publicly available.

²¹ <http://www.mcst.gov.mt/Policy/NationalResearch.aspx>

²² https://procurement-forum.eu/resource/download/428/Eraprism_Best+Practice+Case+Studies.pdf

3.5.3 Indirect financial support for private R&I

Direct funding was and remains the dominant form of financial support for business R&I. Indirect incentives in the form of tax credits have been in place for a number of years but do not appear to be an effective mechanism for promoting private R&D. Although no data is available on the uptake of the current scheme, the uptake of the earlier tax credit scheme was very low (Ministry of Finance, April 2013, pp 119), in contrast to the direct funding schemes which are generally fully subscribed. The reasons for this are not clear.

The two indirect support schemes which are currently active are:

- the Research and Development 2014-2020 scheme which subsumed the earlier R&D Tax Credit scheme which came to a close in 2014. Details of this scheme have been provided in the previous section;
- the Tax Exemption on Royalty Income from Patents Scheme encourage researchers and organisations to exploit IP through the licensing of patented knowledge and to encourage organisations to invest in research and knowledge creation. It provides exemption from income tax to individuals and organisations receiving income from royalties paid by third parties for use of patented IP. The third party must be using the IP in a productive economic activity such as manufacturing, software development or data processing²³. In line with OECD and EC agreements no new entrants will be allowed after June 2016. Malta Enterprise is currently working on the development a replacement measure which respect the Modified Nexus Approach as defined by OECD (<http://www.maltaenterprise.com/en/support/royalty-income-patents>).

3.6 Business R&D

3.6.1 The development in business R&D intensity

Maltese BERD intensity has been rather low throughout the last decade (0.35-0.51% of GDP). Before and during the crisis it has been slightly decreasing (2006: 0.38% of GDP, 2009: 0.33% of GDP) and was steadily increasing in the post-crisis period, reaching 0.51% of GDP by 2014 (Figure 15).

From sectorial point of view the main driver of the growth has been the business services sector (Figure 15). Its share as contributor to total BERD outpaced for the first time that of the manufacturing, which has been stagnating between 2008 and 2012 and decreasing in 2013 mainly as a result of a drop in pharmaceutical BERD (Figure 17). Business services BERD practically tripled since 2009 driven by the strong growth in ICT BERD (Figure 18). This is mainly due to the booming online gaming sector – Malta hosts a range of companies operating in the field. The ICT sector is given priority to in several strategic documents, there is a stable and favourable regulatory environment and the country also set up an ICT Innovation Hub.

²³ RIO Country Report 2014: Malta

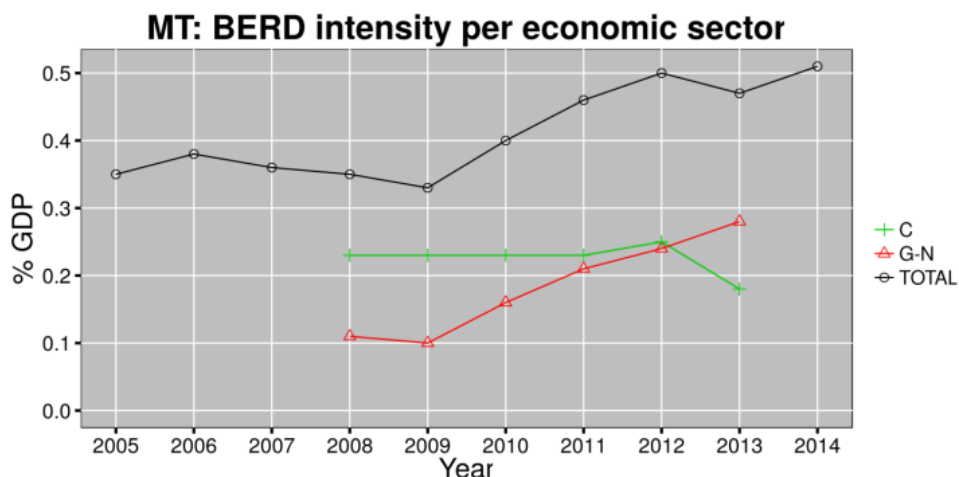


Figure 15 BERD intensity broken down by most important macro sectors (C= manufacture, G_N=services)

Concerning the financing, the main funder of BERD is the business sector itself accounting for 75-85% of total funding. Based on Eurostat data, external financing comes overwhelmingly from enterprises within the same group. Public sources are practically marginal in BERD financing (Figure 16).

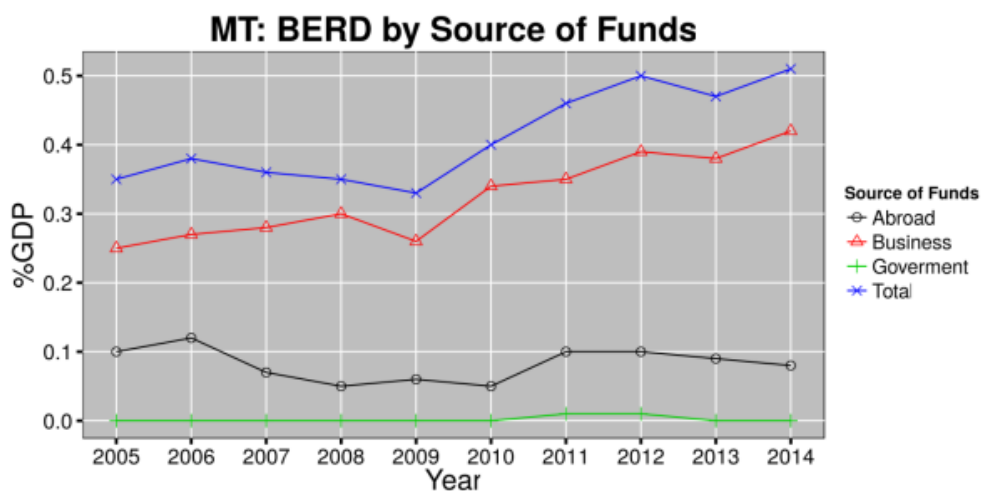


Figure 16 BERD by source of funds

3.6.2 The development in business R&D intensity by sector

Based on Figure 17, the highest BERD performers in the manufacturing are high-technology (computer, electronic and optical products – C26 as well as pharmaceuticals – C21) and medium-high tech (automotive industry, C29) sectors. Cumulated BERD in these sectors managed to increase in spite of the crisis. Pharmaceutical BERD has been around €6 m since 2008 except for a spike of €9.7 m in 2012²⁴.

²⁴ Malta applies the "Roche Bolar" exemption, which allows generic pharmaceutical company established in Malta to carry out clinical trials and commercial testing for the purposes of obtaining regulatory approval or other commercial purposes prior to the expiration of the lifetime of the patent concerned

The computer and electronics sector business R&D decreased moderately in 2010-11, but it recovered during the following two years to its "usual" 3.4-3.6 MEUR value. Automotive BERD is on a declining path, at around €1.6-1.8 m in 2012-13.

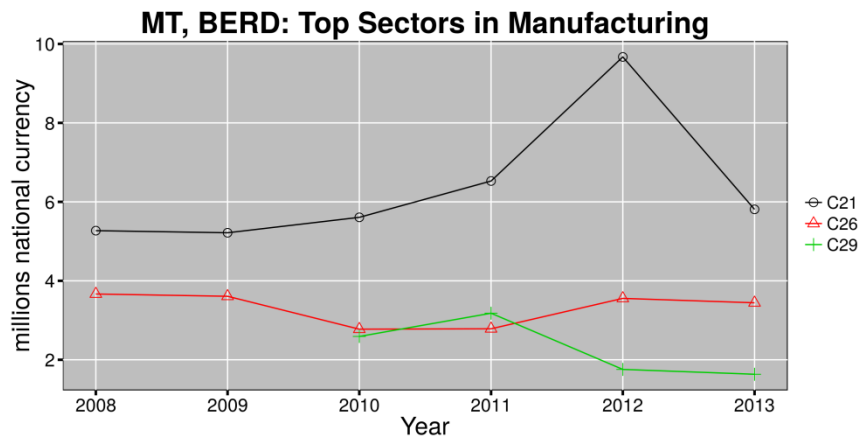


Figure 17 Top sectors in manufacturing (C21= basic pharmaceutical products and pharmaceutical preparations C26= computer, electronic and optical products;; C29= motor vehicles, trailers and semi-trailers)

In the business services sector ICT, wholesale & retail trade as well as professional, scientific and technical activities are the top BERD performers in this order. ICT BERD has been growing steadily and rather strongly: between 2008 and 2013 it recorded a compound average growth rate (CAGR) of 25.8% p.a. Malta managed to attract a range of companies operating in the ICT, and more specifically, in the online gaming sector. Actually, the only Maltese enterprise listed in the EU Industrial Scoreboard 2014 is one of the leading online gaming companies - UNIBET, 424th. Nevertheless, one notices that the R&D expenditure of Unibet in the Industrial Investment Scoreboard is higher than the one of the entire ICT sector in Malta, probably indicating that much of Unibet's R&D is carried out overseas. BERD in the other two services sector has been increasing since the crisis but still of a rather lower level (€1.3-2.1 m p.a.).

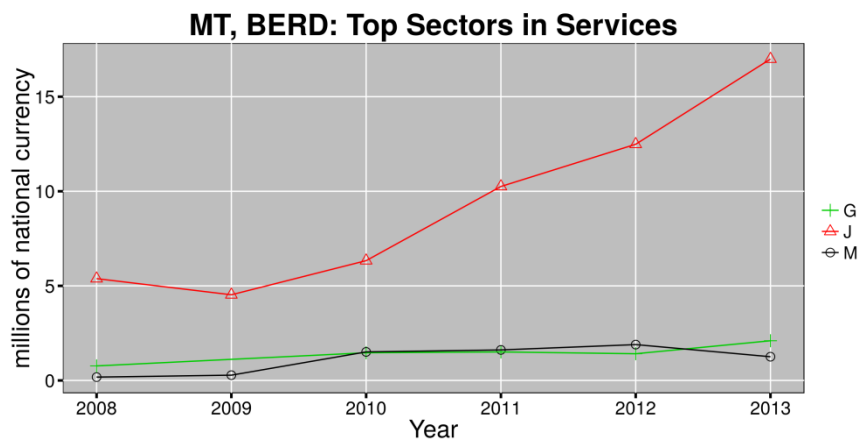


Figure 18 Top service sectors (J=information and communication, G=wholesale and retail trade; repair of motor vehicles and motorcycles, M=professional, scientific and technical activities).

3.6.3 The development in business R&D intensity and value added

When looking at the contribution of the various sectors to the total gross value added (GVA), one notices that wholesale and retail trade, manufacturing, arts & entertainment, financial activities, professional, scientific and technical activities as well as healthcare were the top six sectors providing the highest GVA to the Maltese economy in 2013 (Figure 19, below). Their cumulated GVA in 2013 accounted for more than half of the total GVA of the national economy.

Comparing Figure 17, 18 and 19 one observes that manufacturing and wholesale & retail trade are both top contributors to GVA and top performers of BERD. However, large BERD performing sectors like ICT or professional activities fail to be among the top GVA contributors, although the latter improved its position compared to last year. Arts and healthcare activities are not so important for the Maltese BERD, but they are among the top sectors in terms of GVA. This might be linked to the fact that "besides the traditional areas of tourism, education, health, retailing and banking activities, the services industry expanded to include higher value added activities generated by the financial services sector, specialised forms of tourism – like language schools and dive centres – maritime activity, professional services, back-office administration, information technology and gaming." (Structural Changes in the Maltese Economy, Central Bank of Malta, 2014).

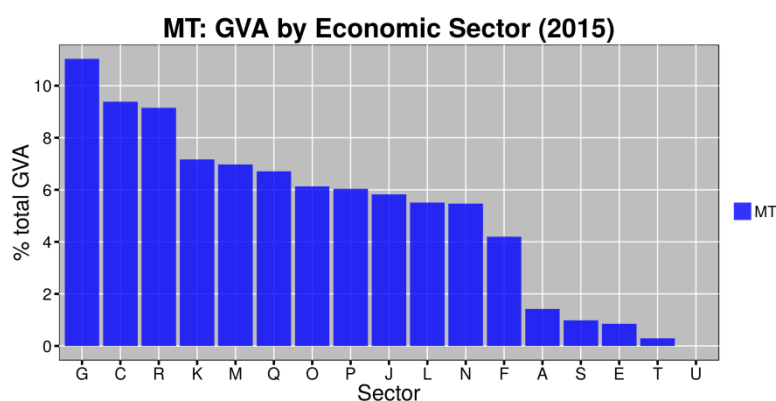


Figure 19 Economic sectors as percentage of the total GVA. Top 6 sectors in decreasing order) 1) G=wholesale and retail trade; repair of vehicles and motorcycles; 2) C=manufacturing; 3) R=Arts, entertainment and recreation; 4) K=Financial and insurance activities; 5) Professional, scientific and technical activities; 6) Q=Human health and social work activities.

The leading manufacturing sectors in terms of GVA are low or medium low-tech sectors, except for chemical industry, which is a medium high-tech sector. Data for some important sectors are confidential (i.e., the computer, electronic and optical products sector) which doesn't allow benchmarking with their importance in BERD.

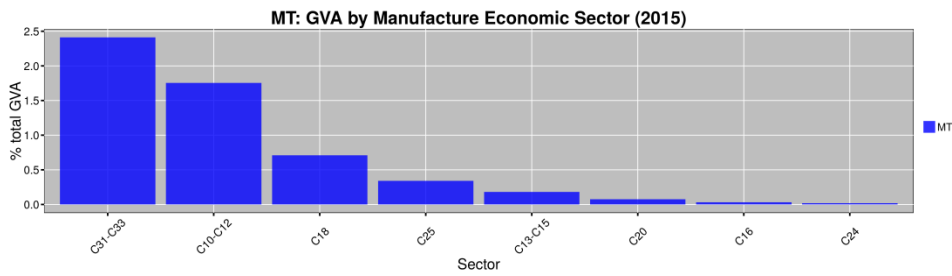


Figure 20 GVA in manufacturing. Top 6 manufacturing sectors: 1) furniture; other manufacturing; 2) food products; beverages and tobacco products; 3) printing and reproduction of recorded media; 4) fabricated metal products, except machinery and equipment; 5) textiles, wearing apparel, leather and related products; 6) chemicals and chemical products.

According to Figure 21, below wholesale & retail trade, ICT and professional activities were the top three sectors in terms of GVA at factor cost throughout the whole period under scrutiny. All three had a generally increasing trend between 2005 and 2015.

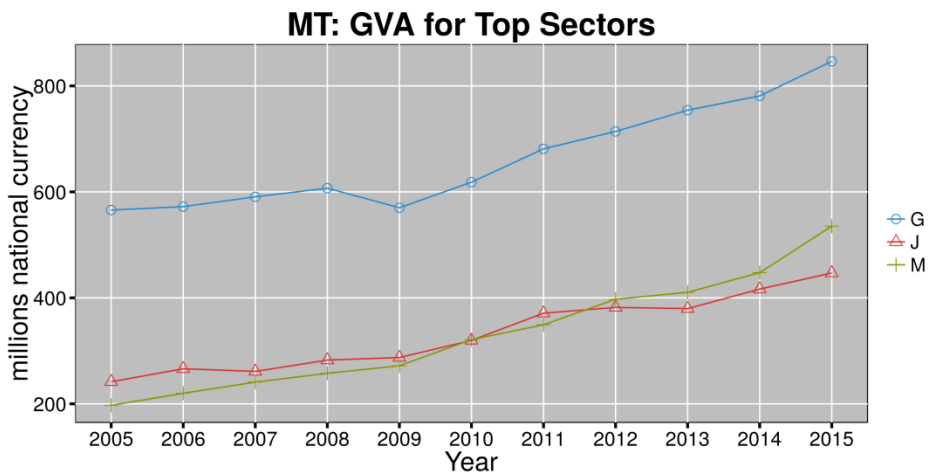


Figure 21 Value added for the leading sectors (some sectors are missing)

Employment in M (professional, scientific and technical activities) and J (information and communication) increased in 2013 compared to 2008. The wholesale and retail sector (G) shed some workers, but remained almost at the same level in the period 2008-2013, with some fluctuations. Data for employees in the manufacturing sector are not available. In terms of number of scientists and engineers there were no changes in the four big sectors (manufacturing, wholesale and retail trade, information and communication and professional, scientific and technical activities).

3.7 Assessment

The public R&D funding system has improved significantly in recent years, both in terms of funding levels as well as in the variety of policy instruments seeking to encourage R&D activity. However the landscape is rather uneven. Funding for national and university infrastructure has been made available in large amounts while funding for higher education and public sector research activity is critically low. The entire system is heavily dependent on EU structural funds, leading to disruption in the availability of funding at the changeover from one programming period to the next.

With reference to the 2014-2020 programming period, Malta has allocated only 9% of ESIF funding to R&I compared to an EU average of 12%, with only four countries allocating less than this share. Furthermore, 64% of this is allocated to public research infrastructure (EU28 16%), while failing to make any allocation for R&I activities in public (EU28 12%) or private (EU28 5%) research centres²⁵.

The funding system includes a number of provisions aimed at achieving certain goals rather than just financing R&I. For example, the Technology Development Programme seeks to promote industry-academical collaboration by only accepting proposals by consortia involving both types of partner. The programme also incentivises beneficiaries to produce publications and patents by explicitly considering these amongst the evaluation criteria. The Innovative Clusters Scheme seeks to encourage formal collaboration between enterprises by assisting in the setting-up, expansion and animation of innovation clusters.

The level of public funding for private R&D is very low by EU standards (0.01% of GDP, EU average 0.09% in 2012). Clearly, this can only have a very limited impact in terms of promoting R&D in the business enterprise sector. Despite the shortage of public funding for business R&I, the ERDF R&D Grant Scheme managed by Malta Enterprise was not fully subscribed. While there is no documented evaluation of the scheme, anecdotal evidence suggests that the bureaucracy and onerous reporting requirements associated with the scheme act as a deterrent to potential applicants.

The significant level of investment in national infrastructure between 2012 and 2015 (Life Sciences Park, Digital Hub) has the objective of encouraging local start-ups as well as to attract overseas research-performing organisations to set up shop in Malta. Although these initiatives were only completed towards the end of 2015 there are already encouraging signs of activity. However it is still too early to properly assess their future impact.

Indirect incentives in the form of tax credits do not appear to be an effective mechanism for promoting private R&D. Although no data is available on the uptake of the current scheme, the uptake of the earlier tax credit scheme was very low (Ministry of Finance, April 2013, pp 119), in contrast to the direct funding schemes which attract significantly more interest. However, Maltese authorities believe there is room for improvement in this field as revealed in the NRP 2015. By using the QUEST III model, they estimate that tax incentives have the potential to raise the R&D intensity to 1% of GDP by 2020.

In conclusion, the main shortcoming of the current funding system is the lack of public funding for research activity (as distinct from research infrastructure), both in the private sector and even more so in the higher education sector. In the private sector, lack of adequate public financing for R&I means that it is mainly enterprises which have the required financial reserves which undertake R&I, while financially weaker enterprises are often unable to perform R&I. In the higher education sector, lack of financing severely limits the undertaking of R&D and stunts the development of R&D capacity in this sector.

²⁵ Data provided by EC DG RTD

4. Quality of science base and priorities of the European Research Area

4.1 Quality of the science base

Table 12 Bibliometric indicators, measuring the quality of the science base.

Indicator	Year	Malta	EU average
Number of publications per thousand of population	2013	1.08	1.43
Share of international co-publications	2013	50.4%	36.4%
Number of int'l publications per thousand of population	2013	0.54	0.52
Percentage of publications in the top 10% most cited publications	2000-2013	9.92%	11.29
Share of public-private co-publications	2011-2013	1.23%	1.8%
Share of public-private co-publications (SciVal)	2011-2013	1.2%	1.8%
Public-private co-publications per million population (SciVal)	2011-2013	37.97	87.07
Public-private co-publications per million population (IUS) **	2011	8.4	52.8

Source: JRC IPTS RIO elaboration on Scopus data collected by Sciencemetric in a study for the European Commission DG RTD (Campbell, 2013). The share of public-private co-publications is derived from the Scival²⁶ platform and is also based on Scopus data (September 2015). The data on public-private co-publications is not fully compatible with the data included in the IUS, due to differences in the methodology and the publication database adopted.

A number of indicators of scientific output as listed above show that Malta generally fares poorly compared to most other EU countries. This is not surprising given the low funding intensity prevailing in the country.

In 2013 Malta's output in terms of scientific publications per thousand population was 1.08 compared to an EU average of 1.43, placing it in 22nd position in the EU. Figure 4.1 below plots the scientific output against R&D expenditure per capita for EU countries, showing a strong correlation between the two. Malta's performance in terms of this index is thus to be expected, with a ranking close to that of its R&D expenditure per capita.

²⁶ SciVal[®] is a registered trademark of Elsevier Properties S.A., used under license

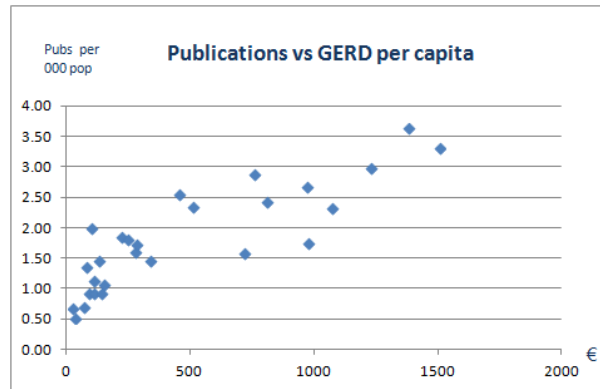


Figure 22 Scatter diagram of Publications per thousand population vs GERD per capita (€) for EU countries.

When focusing on the share of international publications, Malta’s performance is surprisingly good. Just over 50% of publications involving a Maltese author were international co-publications, ranking Malta in 11th place on this indicator and well above the EU average. In terms of international publications per thousand population, Malta ranks 20th among EU countries but still manages to surpass the EU average. This is in spite of the fact that there are no policy measures encouraging such international cooperation. The fact that Malta has only one research university seemingly encourages local researchers to collaborate with overseas colleagues, thus contributing to good results on this metric.

It also appears that the publications are of above-average quality, and over the period 2000-2013, 9.9% of Malta’s publications were included in the list of the top 10% most cited publications, placing it in 18th position within the EU.

Over the period 2011-2013, Malta’s share of public-private co-publications was 1.23% placing it in 17th position in the EU. This is better than expected given the low level of public-private research cooperation referred to in section 5.7 of this report.

4.2 Optimal transnational co-operation and competition

4.2.1 Joint programming, research agendas and calls

Due to Malta’s limited resources, there is no regular national funding for participation in joint research initiatives with the exception of the Eurostars Programme. In 2015 the MCST launched the Internationalisation Partnership Award Scheme which provides grants of up to €5,000 for networking but does not finance research. In spite of this, there has been a fair level of involvement in transnational activities which in most cases was the result of grassroots initiatives rather than of a top-down structured approach. The National R&I Strategy 2020 mentions international cooperation and joint programming on a number of occasions, and proposes consideration of future policy action in these areas. In pursuit of a more strategic approach, the MCST undertook a review of participation in transnational cooperation initiatives (MCST, 2015), and made a number of recommendations which will feed into the R&I Action Plan.

At the policy level, Maltese delegates participate in a number of different groups/boards of the IMI 2 JU, Clean Sky 2 JU, and ECSEL JU (the follow-up to ENIAC JU). Until the end of 2014, Malta also followed a number of JPIS as an observer (JPI AMR, JPI HDHL, JPI Oceans) and as a member of JPI Urban Europe. However, such participation has not had any noticeable impact in terms of aligning the national research system with that of the EU or with other European countries.

Malta has been active in regional initiatives relating to the Mediterranean area for a number of years and in 1995 it was one of the founding members of the Monitoring Committee for Euro-Mediterranean Cooperation in Research and Innovation (MoCo). Another project in which Malta participates is "PRIMA" - "Partnership for Research and Innovation in the Mediterranean Area"²⁷. Once again, however, this has had minimal effect on national priorities and has not resulted in any collaborative initiatives with regional partners.

Maltese researchers have participated in projects funded under Clean Sky 1, ENIAC JU, SESAR JU and Eurostars. Participation in the ENIAC Joint Undertaking was made possible through an ad hoc allocation of €2m of national funding in 2013. Malta is also participating in two EraNets and has made funding available for local participants (<http://mcst.gov.mt/all/ri-funding-unit/international-programmes/previous-calls>).

To date there have not been any ex-post evaluations of participation in these initiatives and their impact on the competence and skills of participating researchers. Nevertheless, collaboration with world-class partners such as Airbus in the Clean Sky JU, to mention one example, constitutes an outstanding opportunity for Maltese researchers and cannot fail to have a positive impact in this respect.

4.2.2 RI roadmaps and ESFRI

Malta is one of the few EU countries which does not have a national research infrastructure roadmap, or plans for the development of such a document. However, the National R&I Strategy highlights investment in research infrastructure as an essential element towards achieving its second objective of strengthening the local knowledge base. It specifies that future investments should focus primarily on the identified thematic specialisations, and should be backed by a clear economic or social rationale. In this regard, the Health specialisation area was specifically mentioned in the new ERDF operational programme (MEAIM, March 2015).

With regard to participation in major research infrastructures, the National Strategy proposes that this should focus primarily on those infrastructures which are closely linked to Malta's smart specialisation areas. It also suggests that diplomatic efforts should be made to ensure access and availability of major research infrastructures to local Maltese researchers even in cases where it is not economically feasible for Malta to be a full member of such infrastructures.

It comes as no surprise that Malta is rather limited in respect of its existing national research infrastructures, with the only example being the marine hatchery at the Malta Aquaculture Research Centre. The Life Sciences Centre recently constructed using structural funds provides research workspace for industry, but does not in itself constitute a research infrastructure.

In the field of academia, the picture is more positive with the University of Malta incorporating a number of research laboratories which can be considered as small scale research infrastructures. These have been the subject of considerable investment and upgrading in recent years and the university has been a major beneficiary of structural funds since 2011. Indeed, this activity absorbed most of the structural funds allocated to R&I during the 2007-2013 programming period, with an estimated €17.6m of funding utilised for this purpose (www.investinginyourfuture.gov.mt). In the absence of a national roadmap, decisions on what infrastructures to develop at the University of Malta are very much the prerogative of that institution and may not necessarily conform to national priorities.

²⁷ <https://ec.europa.eu/research/environment/index.cfm?pg=prima>

Looking towards the future, there are no plans for allocation of national funding for developing research infrastructures. However, €45.7m of ERDF funding from the 2014-2020 programming period has been allocated to public research infrastructure, equivalent to about 64% of the total ERDF allocation for R&I (MEAIM, March 2015). This is the highest percentage allocation of any EU country, and is four times the EU28 average.

The operational programme for the European Maritime and Fisheries Fund (MEAIM, March 2015) also indicates that funding will be allocated to Malta Aquaculture Research Centre (Ministry for Sustainable Development, June 2014), although the level of such funding is not specified.

While there are no national initiatives, policy measures or funding sources related to participation in ESFRI or other inter-governmental infrastructures, there has been a fair level of activity in this area. The University of Malta forms part of the Geant network and has been involved in the JERICO (costal observatories) and EUMedGrid (Mediterranean e-infrastructures) initiatives. The University is also an active participant in two pan-European RIs forming part of the ESFRI Roadmap, namely BBMRI ERIC (under Biological and Medical Sciences) and DARIAH ERIC (under Social Sciences and Humanities). A number of stakeholders have expressed a desire to participate in other ESFRI initiatives such as the CLARIN ERIC, SHARE ERIC, PRACE RI, and ECRIN ERIC. However, this has not been possible due to lack of financial resources (MCST, 2014).

Other relevant initiatives include a cooperation agreement signed with CERN in 2008 which led to scientific and technical collaboration between this institution and the University of Malta in the fields of physics, engineering and information. Fourteen communications technology students from Malta have also had the opportunity to participate in the CERN Summer Student Programme. A cooperation agreement between the University of Malta and the European Molecular Biology Laboratory was signed in 2014. Access to the Diamond Light Source stations I19 and I11 in Oxfordshire was supported through a pilot scheme launched by MCST (MCST, 2014).

4.3 International cooperation with third countries

Malta does not yet have a documented strategy on international cooperation. The National R&I Strategy 2020 mentions international cooperation on a number of occasions, and proposes consideration of future policy action while stopping short of establishing any specific direction. A detailed review of international cooperation was undertaken by the MCST and completed in early 2014, with the intention that its recommendations will feed into the development of the R&I Action Plan (MCST, 2014).

The same study reports that although Malta is signatory to a number of bilateral R&I cooperation agreements, none of these have been actively followed up because of lack of resources. However, Malta has been active in regional initiatives relating to the Mediterranean area and in 1995 it was one of the founding members of the Monitoring Committee for Euro-Mediterranean Cooperation in Research and Innovation (MoCo). This policy dialogue platform brings together EU Member States and all Mediterranean countries with the remit of making recommendations for the joint implementation of research and innovation policy priorities (MCST, 2014).

In recent years Malta has endeavoured to take on a more strategic role in the co-design of effective policies and measures in the Euro-Mediterranean region, primarily through participation in the MIRA project and more recently in the Med-Spring project. Both of these projects are coordination and support actions funded through the FP7 Inco activity. The Med-Spring project builds on the previous experience of MIRA but focuses on three societal challenges; Energy, Food, and Resources.

Malta is also a partner in two EraNets - ERANET-MED and ARIMNET II. ERANET-MED targeted renewable energy and water resources while ARIMNET II is focused on the field of agricultural research.

Through its participation in the ERANET-Med project, Malta is also involved in the PRIMA initiative (Partnership in Research and Innovation in the Mediterranean Area) which is currently being considered by the European Commission as an Article 185 Initiative. If successful, PRIMA will establish permanent collaboration among member states and countries in the Mediterranean region. PRIMA will address topics relating to food systems and water resources, touching on several other thematic areas including health, climate change, energy, biodiversity, coastal sea management and agriculture.

4.4 An open labour market for researchers.

4.4.1 Introduction

The Maltese labour market for publicly-funded researchers is dominated by the University of Malta which enjoys a high degree of autonomy and has established its own regulations regarding the recruitment and career progression of researchers. Public Research Organisations and public sector research departments, on the other hand, are governed by the generic Public Service Management Code which applies to all public sector employees and does not make special provision for researchers.

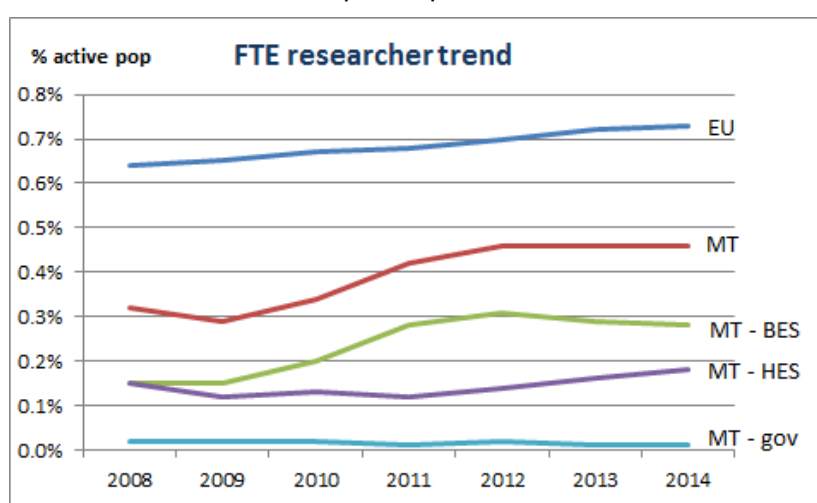


Figure 23 Trend in FTE researchers as % of active population in Malta and EU

The total researcher population has increased significantly in recent years as would be expected given the significant increases in GERD. As is the case with GERD, the number of FTE researchers in Malta is still low by EU standards, accounting for only 0.46% of the total active population compared to 0.73% in the EU in 2014 (Eurostat). Nevertheless, this is surprisingly high, considering that GERD in Malta is only 0.85% of GDP compared to an EU average of 2.02%. The figures are even more surprising if one focuses on the business sector, where researchers constitute 0.28% of the active population compared to 0.36% in the EU, while BERD stood at 0.51% of GDP compared 1.30% in the EU.

In absolute terms the number of researchers is small, with only 891 FTE in 2014. The greatest growth has been in the business sector, where the number of FTE researchers has more than doubled over the period 2009 – 2013.

Figures for supply and demand of researchers in Malta are not available.

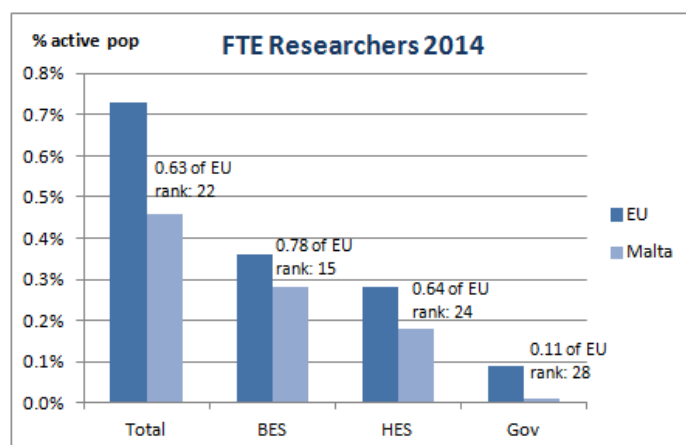


Figure 24 Breakdown by sector of FTE researchers as % of active population in Malta and EU

4.4.2 Open, transparent and merit-based recruitment of researchers

There are no legislative measures specifically addressing the recruitment of researchers. The National R&I Strategy 2020 encourages employers to officially endorse the Charter and Code, but this is not backed up by any policy measures.

Approximately 97% of publicly-funded researchers are engaged in the academic sector, with only a handful of researchers in the public sector and PROs (Eurostat 2015). The University of Malta accounts for the great majority of researchers working in the higher education sector, although MCAST has strengthened its presence in recent years. It has documented and published detailed recruitment guidelines which govern the recruitment process, selection criteria, constitution of the selection committee and appeals procedure (University of Malta, undated). The selection committee is composed of 6 or 7 individuals including senior personnel and a member of the University's Council, although it does not normally include external international members. Posts are advertised both in the local press as well as on the university website, although they do not appear on the Euraxess website. The process largely conforms to the principles of transparent, open and merit-based recruitment. There is no evidence of an assessment or review of the hiring and career development process.

The process for recruitment of researchers at Public Research Organisations is also essentially open, transparent and based on merit. Recruitment procedures are governed by the Public Service Management Code (Office of the Prime Minister, undated). Researcher vacancies are published in national portals but not on the Euraxess portal.

The University of Malta also benefits from a high degree of autonomy in development of strategy and practices regarding education, research and innovation. However, it is obliged to provide full-time undergraduate education to EU students free of charge (although it is permitted to levy charges for part-time courses), severely impacting its ability to raise revenue and achieve greater financial autonomy.

Public research organisations also enjoy a degree of autonomy in relation to their research and innovation activities, but in practice their dependence on a limited financial allocation from central government does impose restrictions on the range of activities that they may undertake.

The scientific labour market in Malta is open to foreign researchers and there are no legal or other barriers which could hinder access to such nationals. The researcher visa regulations for third country nationals came into force by virtue of Legal Notice 102 of 2008. English is spoken freely and is one of the island's official languages, as well as being the language of choice at tertiary education level. Foreign qualifications can be evaluated by the National Committee for Further and Higher Education and mapped to

the Malta Qualifications Framework. On the other hand there are no specific measures aimed at attracting foreign nationals.

Opportunities for researchers have improved in recent years, but Malta has a limited offering in terms of remuneration or research infrastructures. On the other hand it offers a good climate and good quality of life, which may account for the fact that the number of foreign researchers in Malta increased from 1 in 2007 to 71 in 2013, with 57 of these researchers coming from other EU countries.

As the dominant employer of publicly-funded researchers, the University of Malta has a strong impact on the career prospect of this category of researchers. The overwhelming majority of these are not full-time researchers but rather permanent members of teaching staff who are involved in research on a part-time basis. This explains the fact that while there were 649 researchers in HEI in 2012, this translated into only 252 full time equivalents (Eurostat 2015). The full-time researcher posts usually arise in relation to projects funded through the FP7 / H2020 or Fusion programmes. These are generally temporary junior positions, leading to loss of expertise as researchers are constrained to take up alternative careers once funding runs dry. There is no direct progression between the two career streams, but anecdotal evidence suggests that several researchers on fixed-term contracts try to obtain permanent academic posts which will provide them with job security while allowing them to pursue a measure of research activity. The Reach High postdoctoral grant scheme launched in 2015 provides additional opportunities for researchers following their Ph.D studies that was missing in previous years.

This situation explains the findings of the Researchers' Report 2013, which reported that in 2012 only 4.8% of researchers in Malta were employed on fixed-term contracts, compared to an EU average of 34.3% (EC, 2013). Paradoxically, an increasing number of new opportunities for researchers in terms of fixed-term contracts may result in a more unstable job market but is nevertheless a positive development.

The same report also indicated that the research community in Malta is relatively young and Malta has the highest percentage of HRST in the 25-34 age bracket in the EU, with 49% of workers falling into this category compared to an EU average of 30%. This arises from the significant increases in the number of individuals following tertiary education and in the growth in research activity in the last two decades.

The financial crisis has not negatively affected funding levels for research in Malta and consequently has not impacted the labour market for researchers.

4.4.3 Access to and portability of grants

Access

As a general rule, cross-border access to national grants is not possible, and researchers affiliated in foreign institutions are not eligible for funding from Maltese grant schemes. In the case of the Fusion Programme (managed by MCST), funding is restricted to Maltese legal entities while foreign organisations are allowed to form part of the project consortium but are not eligible for funding. With regard to the various grant schemes operated by Malta Enterprise, these have the express objective of stimulating industrial and economic development in Malta and access is consequently restricted to enterprises which are registered in Malta.

The doctorate and post-doctoral grant schemes financed through national and ESIF funds which are managed by the Ministry for Education and Employment are only open to Maltese citizens or to those having obtained permanent residence in Malta.

Portability

Portability of national grants is not possible. R&I project funding from both the Fusion Programme as well as through the Malta Enterprise schemes is awarded to an organisation rather than to an individual.

If the nominated principal investigator transfers from a local to a foreign institution, then he or she can no longer be funded through the grant.

In the case of doctoral and post-doctoral grant schemes, where the beneficiary is an individual, beneficiaries are free to pursue their studies at their University of choice including at overseas institutions. However, the grant is tied to the institution identified at the application stage and the regulations do not cater for instances where the beneficiary wishes to change the hosting institution.

The National R&I Strategy 2020 does not address the issue of access to and portability of national grants and there are no planned measures or changes to the current situation.

4.4.4 Doctoral training

Doctoral training and degrees are available locally through the University of Malta which is the only public university on the island. It enjoys a high degree of institutional autonomy in most areas including in the development of its doctoral programmes. It is subject to the Education Act (Chapter 327 of the Laws of Malta), and has published appropriate regulations (University of Malta, 2014).

The doctoral framework includes a two-tier structure incorporating a number of Faculty Doctoral Committees overseen by a Senate Doctoral Committee. A doctoral research proposal is prepared by a prospective student in collaboration with the principal supervisor, and must be reviewed and accepted by the Faculty Doctoral Committee before going to the Senate Doctoral Committee for final approval. During the course of the research, the principal supervisor is required to submit an annual progress report to the Faculty Doctoral Committee which ensures that progress is adequate and up to standard. Students are also encouraged to submit their own progress reports to the committee.

The doctoral training of course aims for research excellence, and recent upgrades to the infrastructure and equipment in a number of University laboratories permit the undertaking of better-quality research. The programme is also undertaken in an attractive institutional environment.

Exposure to local industry is not a formal requirement but is sometimes the case, and the University has a philosophy of pragmatic research tuned to the needs of industry and of the country. Students often have the opportunity to join in international networking activities and to present their findings at conferences overseas.

The Researchers' Report 2013 for Malta states that there are no measures in place to increase the quality of its doctoral training (EC DG RTD, undated), presumably referring to the fact¹¹ that the principles of innovative doctoral training have not yet been incorporated into the University's approach. Nevertheless, the doctoral degree programmes incorporate many of the principles of innovative doctoral training.

There is no publicly-available report on evaluation of doctoral training.

4.4.5 Gender equality and gender mainstreaming in research

The issue of gender equality is not specifically addressed in the National R&I Strategy 2020. At a national level, Malta has a recent gender equality strategy (Employment and Training Corporation, 2009) which expired in 2010 and has not been renewed. There are no policy guidelines, measures, incentives or targets specifically addressing the gender dimension in research.

Despite the absence of any documented policy, however, recent years have seen the introduction of a number of incentives aimed at encouraging women to continue working. These include an extension of maternity leave allowance, introduction of additional free childcare centres, tax credits for those using private childcare centres, and tax credits for women returning to work after an absence of five years or more.

The public service employment conditions promote teleworking opportunities and accreditation of social security contributions of the parents for the first two years of parental leave.

4.5 Optimal circulation and Open Access to scientific knowledge

4.5.1 e-Infrastructures and researchers electronic identity

However, at an institutional level the University of Malta has implemented a number of measures including an open source e-learning platform for use by academics, researchers and students. The University is also connected to the GEANT education network, thus giving academics and researchers access to digital research services in other countries. The University is also in the process of joining the eduGAIN identity federation.

However there have not been any initiatives or measures taken at a national level, and neither have any of these topics been addressed in Malta's national R&I strategy.

In September 2014 the University also implemented a digital institutional repository which is the only online repository of its kind in the country.

In 2014 the University of Malta completed a project for the development of a supercomputer laboratory for use by academics as well as by research-performing SMEs. This enhances the research potential of the university as well as facilitating collaboration with industry and the development of a knowledge-based economy.

There have not been any initiatives or measures to address challenges such as personal data security, the scope of personal data use, and identity validation and tracking. Neither has there been any consideration of such issues in policy documents.

4.5.2 Open Access to publications and data

The National R&I Strategy has a positive approach to the concept of open access but stops short of making any specific recommendations. The Technology Development Programme also promotes the open access concept by encouraging the publication of research results in open access mode, but lack of data results arising from this programme make it impossible to assess the effectiveness of this policy. Beneficiaries of the Malta Enterprise research funding schemes for industry have no such obligations.

An open access policy has not yet been adopted by any Maltese entity, although the University of Malta has a draft policy which is to be submitted to Senate for its consideration in the coming months. Until such time as a policy is adopted, the University is an active participant in the OpenAIRE Plus project and in Oct 2015 organised a conference to raise awareness on the subject. The University also launched its much-awaited institutional repository in September 2014, an important step forward since this is the first and only online repository of its kind in the country.

In spite of the lack of formal open access policies, however, it appears that the percentage of scientific publications which include a Maltese author published in open access mode exceeds the EU average. The results of a recent study are reproduced in the table below (Archambault et al, October 2014).

Table 13 Open access journals by type

	Malta	EU
Green OA journals	5.0%	9.4%
Gold OA journals	21%	8.6%
Other OA journals	29%	34.9%
Total	54%	51.3%

5. Framework conditions for R&I and Science-Business cooperation

5.1 General policy environment for business

According to the 2015 World Bank report on the ease of doing business, Malta ranked 94th out of the 189 countries considered, and has the lowest rank of all the EU member states. Nevertheless, this is an improvement on earlier assessments since Malta was ranked in 101st place in 2013 and 103rd in 2014. Malta ranked worst on the following indicators: *'getting credit'* (171st place), *'starting a business'* (136th) and *'getting electricity'* (114th). It scored best on *'paying taxes'* (26th), *'I'* (43rd) and *'I'* (51st). However, in reality this appears to have a very limited impact since the World Bank reported that Malta ranked in 7th place in terms of new business density which measures the number of newly registered corporations per 1000 working-age population (<http://data.worldbank.org>).

The Global Competitiveness Report 2014-2015 by the World Economic Forum presents a more optimistic picture, ranking Malta 44th out of the 144 countries covered in the report. While Malta was again assigned a very low ranking in relation to indicators related to starting a business, it fared much better in relation to *'ease of access to loans'* (16th place), *'financing through local equity market'* (25th) and *'affordability of financial services'* (24th).

In relation to *'starting a business'* in 2015 Malta embarked on an exercise to reduce the time to register a private limited company to 3 days. The Register of Companies (ROC) has updated their online system to facilitate registration and a newly formed company is granted approval within 24 hours. Through an automatic online service, the user is also provided with a Tax Identity Number, and an e-form is being created to combine tax, VAT, and trade registrations with the objective that these will be completed within 2 days. With regards to the cost of registering a company, the relevant fees have been reduced from €210 to €100 with effect from January 2016.

On the matter of access to finance, The SBA Factsheet for Malta (EC, October 2015) reports that Malta's performance improved as compared with the previous year and it now ranks above the EU average.

With reference to insolvency procedures, Malta ranked in 86th place in the World Bank report. The SBA Factsheet for Malta (EC, October 2015) reports that Malta continued to perform below the EU average on this score. The average time to resolve insolvency in Malta is 3 years compared to an EU average of 2 years, while the related costs (expressed as a share of the debtor's estate) are the same as the EU average. The level of support (for example eligibility to benefit from support schemes) for entrepreneurs seeking a second start remains below the EU average (Malta 77%, EU 82%). In the Budget Speech for 2016, the government announced that a working group has been set up to review the insolvency law and improve the efficiency of insolvency proceedings. (Ministry for Finance, October 2015).

In spite of these rankings, however, Malta's businesses continues to perform well especially in the SME sector which is one of the very few in the EU to have expanded throughout the financial crisis (EC, October 2015). In 2014 it was estimated to have grown by 5.7% in value-added and by 4% in employment terms.

5.2 Young innovative companies and start-ups

In recent years a number of schemes aimed at promoting innovation in industry have been launched by Malta Enterprise, with one of the most popular being the Innovation Actions Grant Scheme, although this came to a close in 2013. The Fusion Programme managed by MCST has also been successful and provides funding for a number of activities involved in innovation including market research, business planning, meetings with potential investors, product development costing and IP matters. With reference to start-ups, in 2015 Malta Enterprise introduced the Business Start scheme.

A key initiative was the launch of the TAKEOFF Business Incubator by the University of Malta in 2014 (www.takeoff.org.mt). The Incubator provides work space, business support and advice to innovation-driven, scalable start-ups, about 80 % of which originate outside the University and 20 % involve students on the University's post-graduate entrepreneurship programme run by the Centre for Entrepreneurship and Business Incubation. The TAKEOFF staff and external mentors help the start-ups draw up business plans, set milestones and achieve independent functioning within 12-24 months. TAKEOFF connects the start-ups to a support network including experienced mentors/coaches, potential investors and first customers in order to help them achieve product/market fit and obtain early-stage financing. It holds guidance workshops for upcoming entrepreneurs and organises regular sessions with speakers/experts. During 2015 TAKEOFF:

- received over 100 applications by start-ups, and accepted 12 new start-ups (9 start-ups left the incubator);
- organised 22 entrepreneurial events which were attended by a total of over 1130 participants;
- start-ups raised over €1.8M in equity funding, including €70,000 direct investment from the Malta University Holding Company;
- start-ups earned a total revenue of approximately €0.5M;
- start-ups created over 20 new job placements. (University of Malta, April 2016).

The TAKEOFF Seed Fund Award operates on the basis of a competitive call and provides grants of between €2,500 and €20,000 for early-stage and startup development to help develop promising ideas into commercial products and services. The Fund is open to early-stage innovative start-ups and entrepreneurs from both within and outside the University, and to academic staff to assist them in commercialisation of research conducted at the University (proof of concept).

The MCAST Entrepreneurship Centre was set up to provide incubation services to students interested in starting up a business, as was the ICT Innovation Hub at Smart City Malta, which helps entrepreneurs develop an idea into a tangible product. Because of the lower funding levels and the absence of comparable management and advisory structures, both are expected to have less of an impact than TAKEOFF.

A number of other schemes have been in place for a number of years, although these have only had limited success. There are no schemes promoting the development of innovation clusters. Neither is there a knowledge transfer platform, although the University of Malta does operate a Knowledge Transfer Office which offers knowledge transfer services between industry and its staff.

5.3 Entrepreneurship skills and STEM policy

Unfortunately the number of early school leavers in Malta is the second highest in the EU and stands at 20.2% compared to an EU average of 11.3%. The percentage of the population which has completed tertiary education is just 26.0% compared to an EU average of 36.9% (IU Scoreboard 2015, EC, 2015). It is therefore not surprising that a 2010 Eurobarometer study found that 47% of employers in Malta identified a shortage of applicants with the right skills as their main challenge in filling vacancies, compared to an EU average of 33% (EC Nov 2010). Employer surveys indicate that around one in three employers have problems in filling vacancies due to skill shortages (Ministry for Finance, August 2015).

In response to this situation, the Maltese Government has listed addressing skill mismatches as one of its key policy priorities. In recent years a number of policies have been implemented including a series of reforms tackling early school leavers, absenteeism, prioritising learning of mathematics, ICT and science subjects (Ministry for Finance, April 2015). To offer more guidance to students on the choices of jobs that are available for the various lines of studies, an Employability Index is being developed to help channel human resources towards priority sectors in the economy.

The Budget Speech for 2016 reported plans for the establishment of a National Skills Council (Ministry for Finance, October 2015).

A Cedefop report estimates that in 2025, around 26% of job vacancies in Malta will be for professionals (high level occupations in science, engineering healthcare, business and teaching), while the demand for technicians and associate professionals will only be around 9% (Ministry for Finance, August 2015). The government is actively promoting the upgrading of skills, retraining and re-skilling of workers, and a National Lifelong Learning Strategy was adopted in December 2014 (Ministry for Education, Dec 2014). This includes funding for employers to train their employees through the 2014-2020 European Social Fund Operational Programme. A number of grant schemes for undergraduates, postgraduates and post-doctoral studies were introduced in 2006 and subsequent years (<https://education.gov.mt/en/education/myScholarship/Pages/default.aspx>).

In recent years the educational authorities have strengthened collaboration with industry to ensure the relevance of formal education and training. For example, the Malta College for Arts, Science and Technology (MCAST) is now offering new courses on aviation in response to the recent emergence of this sector. The Eurobarometer study referred to earlier also found that Malta scored well above the average when employers were asked about the level of cooperation between business and higher education institutes in designing study programmes (EC Nov 2010).

Recent years have also seen a number of initiatives aimed at promoting entrepreneurship skills at various levels of education. Since 2012, the Ministry for Finance has organised the Entrepreneurship through Education Scheme, in which a number of schools are each awarded a €5,000 budget to organise entrepreneurship training or other activities for their students.

(<https://mfin.gov.mt/en/home/entrepreneurship-2013/Pages/default.aspx>). In 2013, the University of Malta set up a Centre for Entrepreneurship & Business Incubation to provide post-graduate entrepreneurship training and promote the development of an entrepreneurial culture. Likewise the Malta College of Arts, Science and Technology has included entrepreneurship training in most of its courses and in 2014 set up its own entrepreneurship centre (Times of Malta, October 2014). In February 2014, the Ministry of Education unveiled the Framework for Education Strategy for Malta 2012-2024, one objective of which is to encourage entrepreneurship and innovation at all levels (Ministry for Education, Feb 2014).

A number of policy measures are in place to develop HR strategies and support staff training in private enterprise. The Business Advisory Services scheme managed by Malta Enterprise finances consultancy services including HR services (www.maltaenterprise.com/en/support/business-advisory-services). Another scheme managed by Malta Enterprise, the Get Qualified scheme, provides tax credits to individuals interested in obtaining qualifications required by industry (www.maltaenterprise.com/en/support/get-qualified).

5.4 Access to finance

5.4.1 Venture capital and business angels networks

In a 2014 report the Malta Chamber of Commerce, Enterprise and Industry stated that SMEs and knowledge-based enterprises face difficulty in obtaining finance. Malta's banks are primarily retail financial institutions and access to loans and overdrafts is generally only made available to traditional 'bricks and mortar' business and enterprise. In addition, an equity gap exists in the provision of modest amounts of equity finance to SMEs since there are few mechanisms that enable SMEs and startup owners and investors to come together, with investors being more likely to channel financing towards more established enterprises (MCCEI, 2014). Since the publication of this report there have been a number of developments reported in the following paragraphs.

Venture capital funding in Malta has been a problem area for a number of years, and previous attempts by the national government to set up such schemes were never met with success. Plans for a hybrid venture capital fund were announced in the 2014 Budget Speech (Ministry for Finance, Nov 2014, pp31) and Venture Capital Malta was launched in February 2015. This takes the form of a public private partnership and will provide a platform for attracting venture capitalists to Malta.

A Business Angels Network was established in Malta in 2003 but was not successful for a number of reasons, including the quality of the sales pitches to the business angels by potential start-ups, lack of willingness to dilute ownership by founders, high expectations of entrepreneurs and the fact that Malta's small size facilitates informal approaches to venture capital which did not require the usage of this formal business angels network (MBB, April 2013).

Seed capital is also a problem although in recent years there have been a number of initiatives focusing on start-ups. In June 2015 Malta Enterprise launched the Business Start scheme which provides grants of up to €25,000 to innovative start-ups operating in designated sectors. The JEREMIE initiative which was run in collaboration with a local bank was a runaway success. (<https://www.bov.com/page.asp?p=13355>). This was further extended to the JAIME initiative – Joint Assistance Instrument for Maltese Enterprises. The product was made available to the market on 15th February 2016.

The government of Malta together with the Malta Stock Exchange has been working on the development of a strategy to facilitate access to capital for growth and young companies through the local markets. The Multilateral Trading Facility structure was launched in February 2016.

The possibility of using crowdfunding as a means of raising capital has been mentioned in various quarters on a number of occasions. In June 2015 the University of Malta in collaboration with the Malta Business Bureau set up the first crowdfunding platform in Malta, whose operation will be partially supported with government help in the early stages (Times of Malta, June 2015).

5.5 R&D related FDI

As of June 2014, the stock of foreign direct investment in Malta stood at € 136.8 billion, of which the majority was related to financial and insurance activities. However, no information is available regarding how much of this relates to investments associated with R&D activity.

Malta Enterprise manages an Investment Aid Tax Credit scheme which provides tax credits to local or foreign enterprise for investments in setting up of new establishments, extension of existing establishments, and changes to production processes. The scheme targets enterprises operating in a number of predetermined activities, one of which is R&D and Innovation.

(http://www.maltaenterprise.com/sites/default/files/support_measures/investment_aid_2014_-_2020_version_2.pdf). No data is available regarding uptake of this scheme.

The Life Sciences Park which was completed in 2015 hopes to promote local start-ups as well as to attract overseas research-performing organisations operating in the fields of life sciences and biotechnology (www.lifesciencespark.com/).

5.6 Knowledge markets

The National IP Office is responsible for registrations of Trademarks, Patents and Designs, and, analyses and processes applications for such registration. It endeavours to raise awareness regarding IP matters through the participation in events such as the annual SME week.

Maltese legislation is in line with the WTO TRIPS Agreement and also with the EU Acquis. Malta is a member of the Paris and Berne Conventions, the WIPO Copyright and WIPO Performers and Producers of Phonograms Treaty, the Patent Cooperation Treaty and the European Patent Convention. Statistics relating to IP registrations are published yearly and also submitted to WIPO and EPO for their own publications.

The following schemes encourage the development of patents:

The Tax Exemption on Royalty Income from Patents Scheme operated by Malta Enterprise aims to encourage researchers and organisations to exploit IP by providing exemption from income tax on income from royalties paid by third parties for use of patented IP. Although a number of applications have been received, the processing is on hold pending EU State Aid verification of the scheme.

The Fusion Programme managed by the Malta Council for Science and Technology is open to both industry and academia and provides financing for (among other things) IP Checks and Patent Applications. This scheme has financed a number of projects however these are still at an early stage and any resulting patents would be expected as the technologies are furthered in the next 2-3 years. In the meantime, successful pre-2013 (pre-Fusion) projects have resulted in the filing of some limited patents. Fusion is expected to deliver an improvement on patents filed due to the mentoring and focused support it inherently provides to researchers through the Commercialisation Voucher Programme.

5.7 Public-private cooperation and Knowledge transfer

5.7.1 Indicators

Funding: BES-funded/publicly-performed R&D

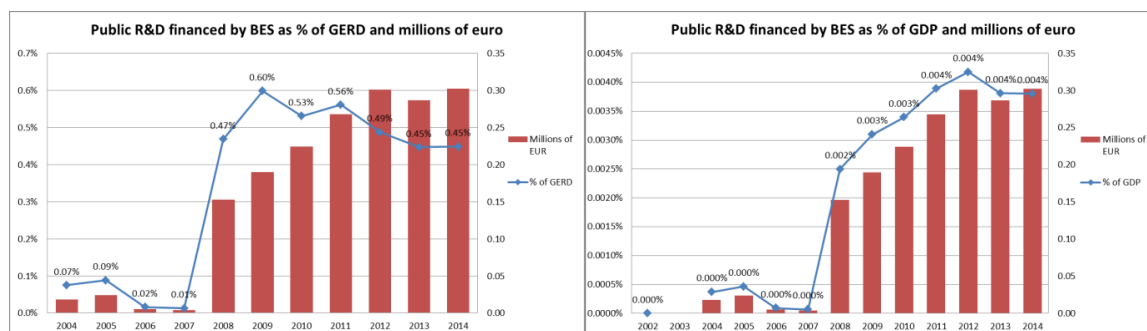


Figure 25 BES-funded public R&D in Malta as % of GERD (in €m and % of GDP) and % of GDP

The level of the Maltese business enterprise (BES)-funded public R&D expenditure is very low. The indicator as a percentage of GERD reached 0.6% in 2009, then decreased steadily until 2014 (0.45%). In view of the small size of the R&D funding expressed in millions of euro, the indicator represents only €0.3m. Figure 25 shows also a drop in private funding to public sector in 2006-2007 (no funding at all), while at the same time the BERD was increasing.

The indicator expressed as a percentage of GDP shows very low values of approximately 0.004% of GDP in the period after 2009.

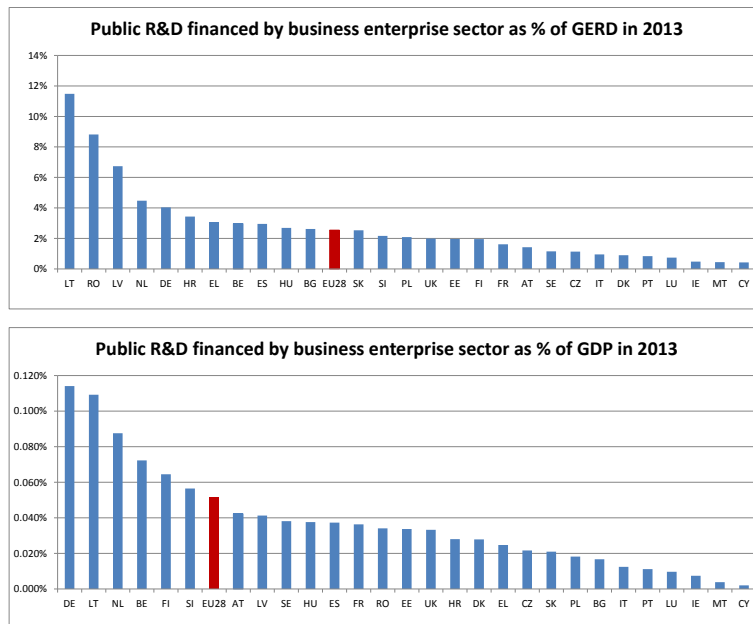


Figure 26 BES-funded public R&D as % of GERD and as % of GDP in 2013 in Member States²⁸

The level of BES-funded public R&D expenditure in Malta is extremely low. In 2013 it was only 0.45% of the total GERD.

In a small size economy like the one of Malta, even a single research contract between BES and PROs/HEIs could already affect positively the privately funded public R&D. Although this drop might appear disturbing, the funding the business sector invests in PROs was almost insignificant before 2008. This was probably partly due to the fact there were no clear framework for the KT related activities. But, starting from 2007 the country deployed new measures to boost research and innovation activities through the National R&I Strategic Plan 2007 - 2010. Then, the implementation of the plan relied on both national and EC funding.

The generally low level of privately funded public R&D indicator has several reasons: the private part of the R&I system is relatively young; it was only recently with the development of some key manufacturing project that the Maltese industry showed interest in R&I. As a general rule, both private and public sectors are funding intramurally their own R&I. Most of the country's business is qualifying as micro and SMEs (more than in other EU Member States) working in traditional, low value added and low knowledge intensive sectors. Also, the knowledge transfer is among the most recent activities of the University of Malta - it is only in the last decade that the University has adopted a business orientation, and only in the last 5-6 years that it has started to put in place the necessary framework to promote collaboration with industry (such as Knowledge Transfer Office, seed fund and business incubator). Malta has only one small PRO operating in the aquaculture sector, and R&D expenditure by government is very low and one of the lowest in the EU.

²⁸ 2013 was chosen as the latest data series providing a full comparison within EU-28.

Funding: Structural funds devoted to knowledge transfer

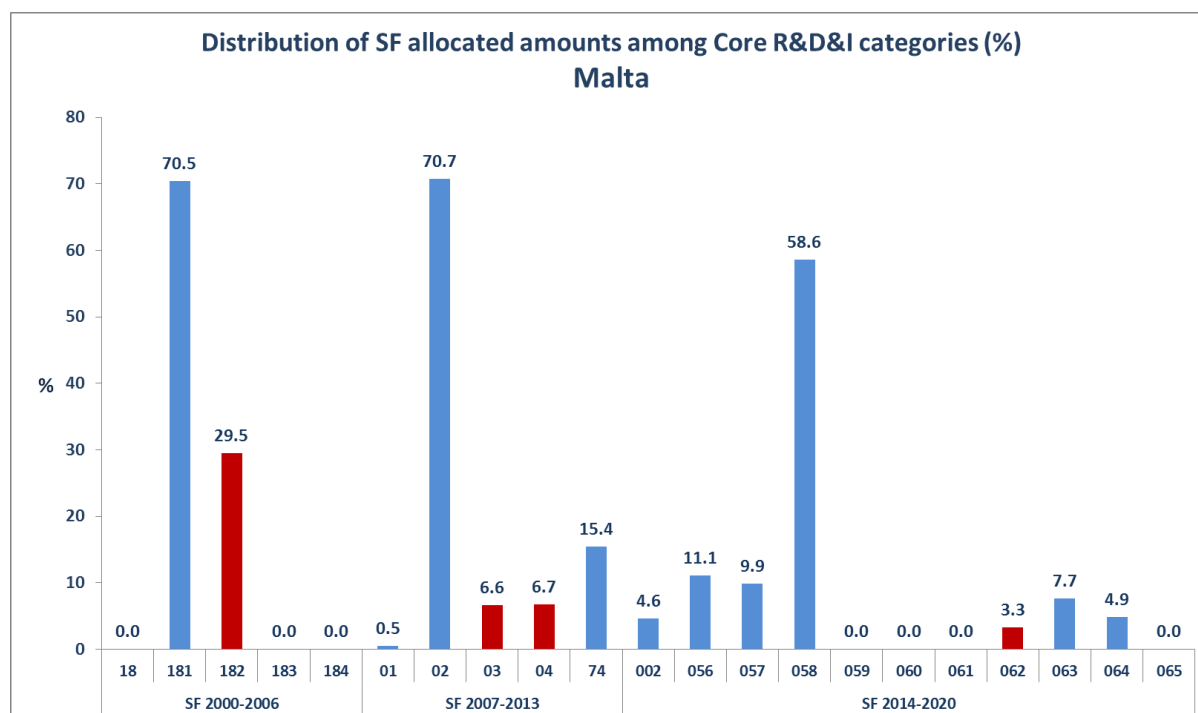


Figure 27 Structural Funds for core R&D activities 2000-2006, 2007-2013 and 2014-2020²⁹. We use the categories: 182 (2000-2006), 03 and 04 (2007-2013) and 062 (2014-2020) as proxies for KT activities.

Malta has allocated 3.3% of its structural funds for core R&D activities to "Technology transfer and university-enterprise cooperation primarily benefiting SMEs" (compared to 29.5% for 2000-2006 and 13.3% in the 2007-2013 programming period). It is significantly lower than the EU average of 15.7% (the EU average was 26.1% for 2000-2006 and 30.1% for 2007-2013).

²⁹ Figure 24 provides the Structural Funds allocated to Malta for each of the above R&D categories. The red bars show the categories used as proxies for KT. Please note that the figures refer to EU funds and they do not include the part co-funded by the Member State. The categories for 2000-2006 include: 18. Research, technological development and innovation (RTDI); 181. Research projects based in universities and research institutes; 182. Innovation and technology transfers, establishment of networks and partnerships between business and/or research institutes; 183. RTDI infrastructures; 184. Training for researchers.

The categories for 2007-2013 include: 01. R&TD activities in research centres; 02. R&TD infrastructure and centres of competence in specific technology; 03. Technology transfer and improvement of cooperation networks; 04. Assistance to R&TD particular in SMEs; 74. Developing human potential in the field of research and innovation.

²⁹ The categories for 2014-2020 include: 002. Research and Innovation processes in large enterprises; 056. Investment in infrastructure, capacities and equipment in SMEs directly linked to Research and Innovation activities; 057. Investment in infrastructure, capacities and equipment in large companies directly linked to Research and Innovation activities; 058. Research and Innovation infrastructure (public); 059. Research and Innovation infrastructure (private, including science parks); 060. Research and Innovation activities in public research centres and centres of competence including networking; 061. Research and Innovation activities in private research centres including networking; 062. Technology transfer and university-enterprise cooperation primarily benefiting SMEs; 063. Cluster support and business networks primarily benefiting SMEs; 064. Research and Innovation processes in SMEs (including voucher schemes, process, design, service and social innovation); 065. Research and Innovation infrastructure, processes, technology transfer and cooperation of enterprises focusing on the low carbon economy and on resilience to climate change.

Cooperation: Share of innovative companies cooperating with academia

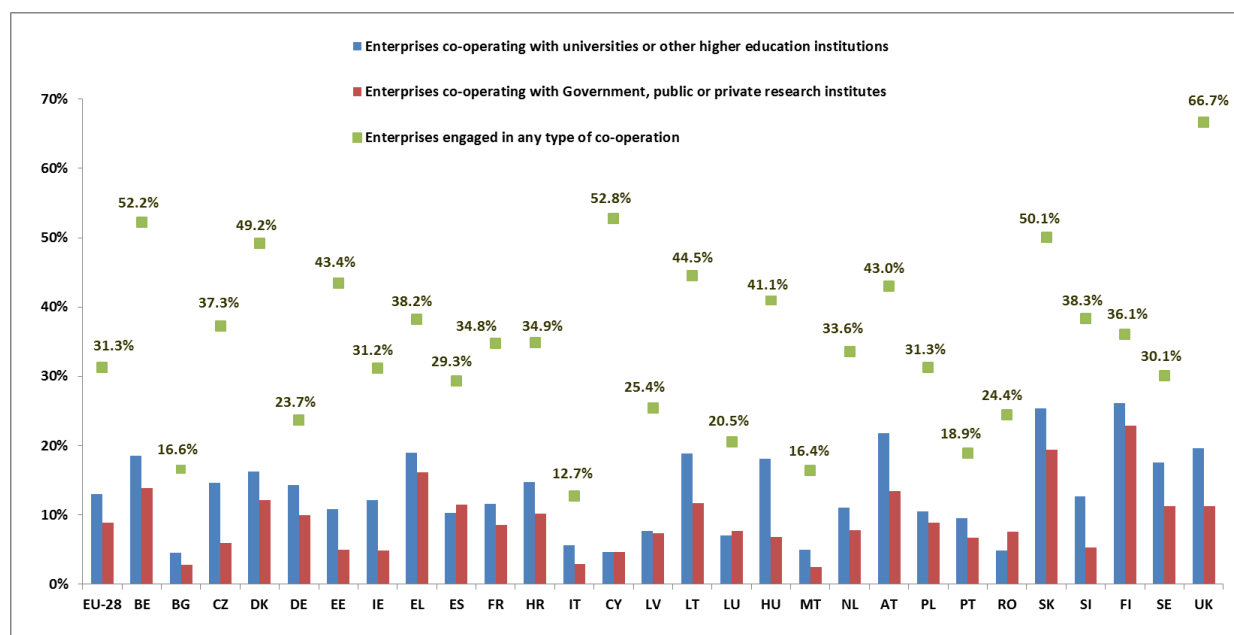


Figure 28 CIS survey 2012 – share of enterprises cooperating with academia

Figure 28 depicts the level of cooperation activities of innovative companies in the EU-28, according to the CIS 2012. In Malta, only 16.4% of innovative companies engaged in any type of cooperation, which is far from the EU-28 31.3%. Even less, namely one third of them (i.e. 5% of total sample of innovative companies) cooperates with universities and higher education institutions. This is comparable to Cyprus (4.6%), which has an economy with a similar structure, but still lower than 13% in EU-28 as a whole. Only 2.5% cooperates with government or public or private research institutes (compared to 4.6% in CY and 8.9% in EU-28). Looking at rate of cooperation of the innovation leaders, Malta still has room for improvement.

Cooperation: Technology Transfer Offices (TTOs), incubators and technological parks

The University of Malta has set up the Knowledge Transfer Office³⁰ to promote and facilitate such interaction. In addition a Centre for Entrepreneurship and Business Incubation³¹ (CEBI) was created with the main purpose to educate and support graduates in the launch of successful Knowledge-Based and Knowledge-Intensive business ventures. Both organisations obtained European Social Fund support for an initiative to foster their activities *Creating a Knowledge Transfer Framework and Technology Entrepreneurship Programme*. Another UM's initiative is the TAKEOFF Business incubator³². The University's RIDT unit (R&I Development Trust) also undertakes initiatives to encourage industry to contribute to its trust fund to finance research which will benefit the contributor. Malta Enterprise is managing the Kordin Business Incubation Centre (KBIC), which is a mixed technology oriented style incubator.

Through ERDF funding Malta's Life Sciences Park was established. The Park's goal is to intensify cooperation in the areas of education, research and innovation by providing state of the art infrastructures, creating access to scarce expertise and increasing access to grants and funds.

³⁰ <http://www.um.edu.mt/knowledgetransfer>

³¹ http://www.um.edu.mt/cebi/about_cebi

³² <http://takeoff.org.mt/>

Ultimately, the Life Sciences Park represents a focal point connecting university students, researchers, lecturers, hospital professional staff and industry to interact and establish new technology and research-based firms as well as cluster³³. Another initiative at national level worth mentioning is the Malta Information Technology Agency's Innovation Hub at SmartCity Malta³⁴. The landscape of Business Supporting Institutions was recently enriched by the launch of MCAST Entrepreneurship Centre – a Malta College of Arts, Science and Technology initiative *to address the needs of the students and alumni of MCAST by delivering tailored business training, facilitating business registration, enhancing access to markets and providing spaces for business development*³⁵.

Cooperation: Share of public-private co-publications

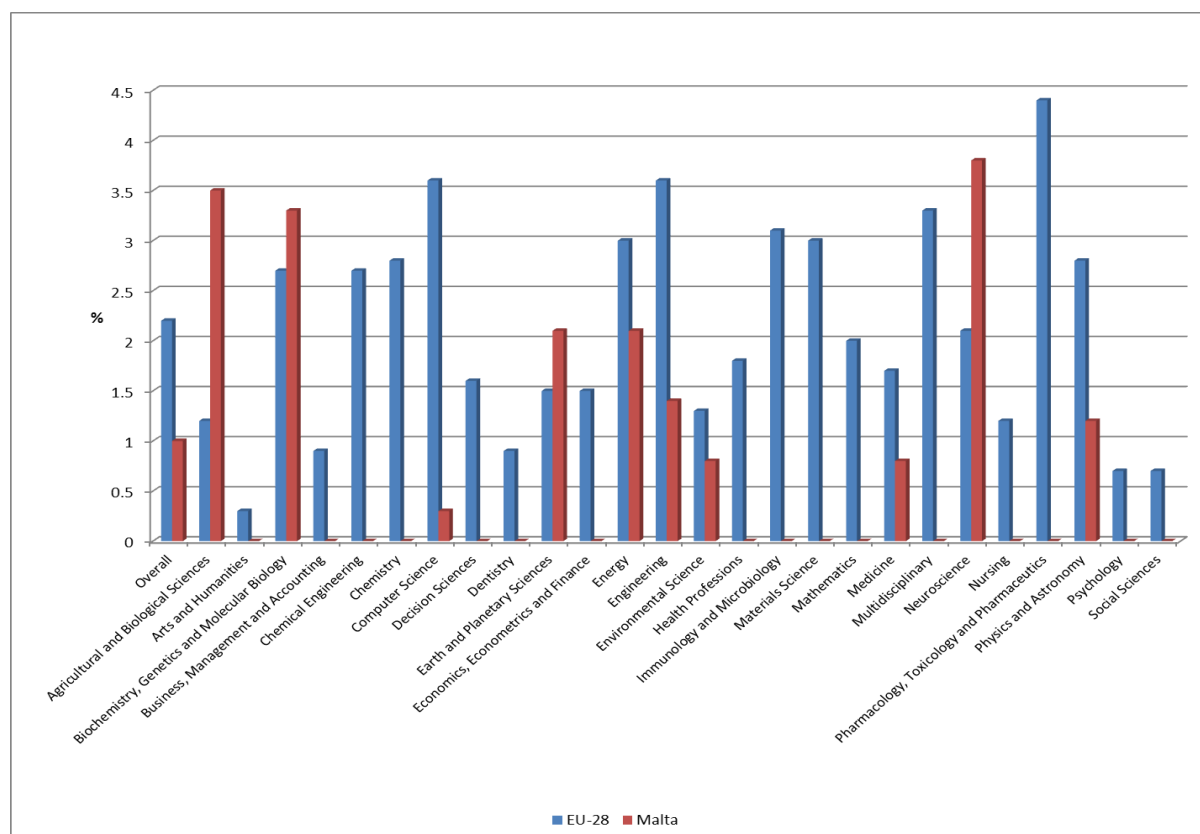


Figure 29 Co-publications by field 2003-2013 in Malta.³⁶

Figure 29 shows the 2003-2013 average percentage of academia-industry co-publications by field in Malta compared to the European average. Scopus data indicate also that the percentage of co-publications has been fluctuating across the years under scrutiny (2003-2013), with 1.6% of academia-business publications in 2013 and below 1% in some of the previous years. Moreover, in 2013 Malta had only 16.6 public-private co-publications per million of population compared to 29 for the EU-28 (13.9 for CY and 182.1 for DK)³⁷.

³³ <http://lifesciencespark.com/about>

³⁴ <http://mita.gov.mt/en/News/Pages/2014/MITA-Innovation-Hub-at-SmartCity-Malta-launched.asp>

³⁵ <http://www.mcastentrepreneurship.com/about.php>

³⁶ The share of public-private co-publications is derived from the Scival platform and is also based on Scopus data (September 2015). SciVal® is a registered trademark of Elsevier Properties S.A., used under license.

³⁷ RIO elaboration based on Scopus data.

The domains with highest percentage of co-publications are neuroscience, agricultural and biological sciences biochemistry, genetics and molecular biology. In these domains Malta performs even better than the EU-28 average.

Cooperation: Inter-sectoral mobility

Overall, the number of FTE researchers in Malta accounted for 0.5% of the total active population, compared to 0.77% in the EU-28 in 2012 (Eurostat). According to Eurostat³⁸, in 2009 there were 4% of the of PhD holders working as researchers in the private sector (2 in BES and 2 in PNP sector). The University of Malta is in favour of collaboration with industry, and the University's employment regulations encourage academics to work with industry. There are also various instances of collaboration with industry at the researcher level, for example in the fields of engineering, aerospace and pharmaceuticals.

A survey of doctorate holders in Malta found that approximately 70% of these are employed in higher education, while only about 6% work in the private sector (Auriol, 2013). These figures seem to imply a lack of qualified researchers in industry, and would suggest a strong need for interaction between the two sectors. Nevertheless, it is believed that mobility between industry and academia is very low, although official figures on this point are not available. It is not clear whether the presumed low mobility levels are due to lack of inclination on the part of university researchers or whether it is a consequence of lack of demand by industry.

The Loan of Highly-Qualified Experts Scheme (see next section) provides cash grants to SMEs to part-finance the costs of engaging experienced researchers on a temporary basis to strengthen their research capacity, thus promoting knowledge transfer between the public and private sector.

Cooperation: Patenting activity of public research organisations and universities together with licensing income

In 2015, a total of 18 registrations were filed by the University of Malta to protect intellectual property - 10 patents and 8 designs. The University has a total of 20 granted patents in its portfolio. None of these have been licensed or sold to industry. According to the Knowledge Transfer Study 2010-2012³⁹, Malta lagged behind in implementation of the KT Recommendations with a score of 34% compared to an EU average of 53%.

Cooperation: Companies

There is no available data on the total number of spin-offs in Malta. Yet, some sources show that at least until 2011 the University of Malta had not yet launched any start-ups (Bartolo, July 2011), but there are some schemes for start-ups managed by Malta Enterprise⁴⁰. Furthermore, most of the institutions involved in the KT policy declare the creation of spin-offs and/or start-ups as one of their priorities or objectives.

5.7.2 Policy measures

There are several policy measures in place involving partners from both camps - academia and business sector.

The Malta Council for Science and Technology (MCST) managed the National R&I Programme (FUSION) which supports Research and Innovation, promotes local research and innovation as well as provides the necessary handholding in order to enable researchers and technologists to turn their innovative ideas into a market ready reality.

³⁸ Eurostat: Employed doctorate holders working as researchers by sex, fields of science and sectors of performance

³⁹ European Commission (2013): Knowledge Transfer Study 2010-2012 Final Report. By empirica GmbH, MERIT, and FHNW

⁴⁰ <http://www.maltaenterprise.com/en/business/assistance/start-ups>

It is divided into two mutually complementing parts:

Commercialisation Voucher Programme⁴¹ aims to offer financial support in order to improve the development and commercialization potential of ideas, be it technological and non-technological, for researchers and enterprises. The Commercialisation Voucher system is to act as a demand side measure and entice user driven innovation, with the ultimate aim of increasing research, technological development and innovation activities for the eventual implementation in industry. In addition, it helps researchers to seek the market potential for their ideas. Such a programme is intended to support further the knowledge transfer between industry and academia as it will enable enterprises to buy knowledge from research institutions and thus stimulate the interaction and exchange of knowledge between them. On the other hand it offers the researchers the possibility to further develop their ideas into technology, products and services which have market applicability.

Technology Development Programme⁴² builds on the scientific opinion and the outcomes of the first five feasibility studies covered by the Commercialisation Voucher Programme, namely, IP Check, Market Research, Product Development Costing, Economic Impact and Risk Profile, Patent application. It provides provide financial support for research, development and innovation in the field of science and technology. The focus is meant to be on Research and Innovation, Knowledge Transfer and collaboration between (1) Academia and (2) Industry with the intent of technology commercialisation. With a funding rate of 50 000-200 000 Euro per project the programme is the most important national instrument in the field. It is measured through the outcomes of a project, including among others: degree of innovation of the project; employment created; further education possibilities; generated investment; number of patents and publications.

Tax Exemption on Royalty Income from Patents:

The objectives of this measure are to encourage researchers and organisations to exploit IP through the licensing of patented knowledge and to encourage organisations to invest in research and knowledge creation. It provides exemption from income tax to individuals and organisations receiving income from royalties paid by third parties for use of patented IP. The third party must be using the IP in a productive economic activity such as manufacturing, software development or data processing⁴³. In line with OECD and EC agreements no new entrants will be allowed after June 2016. Malta Enterprise is currently working on the development a replacement measure which respect the Modified Nexus Approach as defined by OECD.

A European Social Fund funded project, Creating a Knowledge Transfer Framework and Technology Entrepreneurship Programme (completed)⁴⁴, put the University at the centre of the effort aimed at creating a more structured environment for the KT. The project aimed to set up an intellectual property and knowledge transfer framework as well as to introduce an intensive training programme in science and technology entrepreneurship at the University. It addresses a concept that the Malta Chamber strongly supports, that is, to increase business to academia linkages and to foster an entrepreneurial culture through education. Another aim of the project was to develop technology entrepreneurship training and educational programmes that would be supported by e-learning technology. The programmes will stimulate innovative science and technology based start-ups, which is an area that Malta lags behind in EU indicators.

⁴¹ <http://www.mcst.gov.mt/all/launch-commercialisation-voucher-programme>

⁴² <http://www.mcst.gov.mt/all/national-funding/technology-development-programme/open-calls>

⁴³ RIO Country Report 2014: Malta

⁴⁴ <https://investinyourfuture.gov.mt/project/education/creating-a-knowledge-transfer-framework-and-technology-entrepreneurship-training-programme-37060619>

Registration for Intellectual Property Tax Credits for SMEs⁴⁵: This incentive was aimed specifically to SMEs that after conducting an approved Industrial Research or Experimental Development project would like to seek, obtain and validate patents and other intellectual property rights. The tax credit may cover costs incurred in the 24 months after the R&D project was completed. A higher percentage of aid may be provided to enterprises that enter into a formal collaboration agreement with other enterprises or research organisations. This scheme has now closed.

Malta reveals very modest level of public-private cooperation in R&D, as shown by the low level of private investments in publicly-performed R&D, as well as by the percentage of innovative companies collaborating with HEIs and PROs and low scores in public-private co-publications.

On the other side, Malta has put in place several policy and financial measures to boost knowledge transfer activities. These measures were well aligned with main national strategies and plans. Government research capacity is very limited (only one small PRO) thus limiting R&I collaboration between the private sector and government. What is also to be mentioned is that the private part of the R&I system in the country is relatively young and the KT dimension even younger. It was only a few years ago when the process was started by the launch of the Knowledge Transfer Office in the University of Malta, complemented by other support institutions like business incubators and networks later on.

The structure of the economy, largely relies on micro and small companies in less R&D-intensive sectors and there is limited R&I business sector investment in the HEIs and PROs. The reasons for this could lie in the generally low interest of the business in R&I cooperation with academia or the lack of interest towards existing KT schemes which do not match in full the needs of entrepreneurs. Public sector research is mainly geared towards the needs of the national government and is largely limited to the agricultural and fisheries sector. As a consequence, collaboration between business and the public sector is not widespread.

On the other side there are also various instances of collaboration with industry at the researcher level, for example in the fields of engineering, aerospace and pharmaceuticals, but they seem to have only a limited impact on the overall picture.

With the Smart Specialisation Strategy in place, Malta should be able to align better the demand and supply side of the KT process. Notably, the support institutions' (TTOs, clusters) landscape is growing and some infrastructures were put in place to support interaction between business and academia (Life Science Park). Furthermore, important funding instruments are functioning through the National R&I Programme (Fusion) and Malta Enterprise are complementing the organisational improvements with some financial instruments.

The concept of open innovation is not addressed in the National R&I Strategy, and there are no policy measures relevant to this topic.

5.8 Regulation and innovation

Responsibility for Research and Innovation policy lies within the Ministry for Education, while responsibility for policy relating to private enterprise lies within the Enterprise Policy and Schemes Directorate in the Ministry for the Economy, Investment and Small Business. The latter is responsible for the implementation of the Small Business Act (Malta) and one of its achievements is the coming into force of the SME Test in 2015. By virtue of this regulation, all proposed legislation is first reviewed to determine its impact on SMEs.

⁴⁵ <http://www.maltaenterprise.com/en/support/registration-intellectual-property-tax-credits-smes>

The Maltese public service also includes the office of Commissioner for Simplification and Reduction of Bureaucracy, which reviews existing legislation and procedures with the objective of reducing the administrative burden on businesses. However, facilitating innovation is not specifically highlighted as one of the objectives of this office.

There have been no assessments specifically on the impact of regulation on innovation.

5.9 Assessment of the framework conditions for business R&I

Recent years have seen the introduction of a broad range of supply-side measures to encourage business investment in research and innovation. These include a number of funding schemes providing financing for research and innovation activity, business incubators and entrepreneurship centres.

Businesses report a shortage of applicants with the required skills, which is doubtless aggravated by the low unemployment rate. There are a number of policy measures in place to develop the required human resources through a combination of improved education, reskilling and lifelong learning. Entrepreneurship education is also becoming more widespread at all levels of the educational system.

Venture capital and seed funding are not easily available but a variety of initiatives are in hand to improve availability of finance, both on the local market as well as by attracting overseas financing. Concrete initiatives to establish innovative instruments such as crowdfunding are also in hand.

Malta has a modern system for registration and protection of intellectual property.

On the other hand, demand-side policies have not been given due attention and innovative public procurement has not been leveraged to exploit the potential it offers. The National R&I Strategy makes reference to the importance of such measures, but whether this will translate into concrete actions will only become clear when the associated R&I Action Plan is published. This plan is being developed under the direction of a high-level steering group / core group which includes delegates from the various public policymaking bodies and is expected to be finalised at the end of 2015.

6. Conclusions

The policy mix in Malta related to the two identified structural challenges is discussed in Table 13, which lists relevant policy actions, assesses their appropriateness, efficiency and effectiveness. The issue is discussed more in depth in the executive summary of the report.

Table 14 Policy measures addressing structural challenges in Malta.

Challenge	Measures	Assessment
Improving the quality of the science base	<p>Significant investment in infrastructure at the University of Malta.</p> <p>Scholarship schemes for PhD and post-doctoral studies.</p>	<p>Development of infrastructure and HR in recent years constituted important building blocks in terms of improving the science base.</p> <p>However, funding for academic research remains very limited and may severely limit the impact of the investments made in infrastructure and HR.</p>
Increasing R&I investment and output	<p>Various funding schemes and tax incentives aimed at encouraging private sector R&D</p> <p>Various initiatives including fiscal measures aimed at technology transfer, commercialisation of research and promoting innovative startups</p>	<p>Firm and sustained policy drive</p> <p>Broad set of measures in place for a number of years, novel measures introduced in 2015, more measures underway</p> <p>Formal assessments largely lacking</p> <p>Lack of demand-side measures such as innovative public procurement</p> <p>Public funding levels remain low and there are no targets for increased funding.</p>

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Abbreviations

BERD – Business Enterprise R&D
BES – Business Enterprise Sector
CEBI – Centre for Entrepreneurship and Business Incubation
EAFRD – European Agricultural Fund for Rural Development
ERDF – European Regional Development Fund
ESIF – European Structural and Investment Funds
GERD – gross domestic expenditure on R&D
HEI – Higher Education Sector
MITA – Malta Information Technology Agency
MFIN – Ministry of Finance
MBB – Malta Business Bureau
MCAST – Malta College of Arts, Science and Technology
MCCEI – Malta Chamber of Commerce, Enterprise and Industry
MCST – Malta Council for Science and Technology
PNP – Private non-Profit Sector
RIDT – Research & Innovation Development Trust

List of Figures

Figure 1. GDP and unemployment trends in Malta and EU.....	12
Figure 2 Malta and EU GERD performance as % of GDP and 2020 targets	14
Figure 3 R&D expenditure of the different sectors as % of GDP in 2013 (Eurostat Feb 2015).....	15
Figure 4 R&D expenditure of the different sectors as % of BERD in 2013 (Eurostat Dec 2015).....	18
Figure 5 The Maltese R&I system	20
Figure 6 Research expenditure trends of different sectors as percentage of GDP (Eurostat).....	27
Figure 7 Research expenditure trends by type of cost as percentage of GDP (Eurostat)	27
Figure 8 Contribution of different sectors to GERD (Eurostat)	28
Figure 9 Government deficit and public debt.....	29
Figure 10 Development of government funding of the total GERD.....	30
Figure 11 R&D appropriations and government funded GERD in millions of national currency	31
Figure 12 Fiscal consolidation and R&D.....	33
Figure 13 Public research funding (analysis based on Eurostat data)	36
Figure 14 Private research funding (analysis using Eurostat data).....	37
Figure 15 BERD intensity broken down by most important macro sectors (C= manufacture, G_N=services)	45
Figure 16 BERD by source of funds	45
Figure 17 Top sectors in manufacturing (C21= basic pharmaceutical products and pharmaceutical preparations C26= computer, electronic and optical products;; C29= motor vehicles, trailers and semi-trailers).....	46
Figure 18 Top service sectors (J=information and communication, G=wholesale and retail trade; repair of motor vehicles and motorcycles, M=professional, scientific and technical activities).	46
Figure 19 Economic sectors as percentage of the total GVA. Top 6 sectors in decreasing order) 1) G=wholesale and retail trade; repair of vehicles and motorcycles; 2) C=manufacturing; 3) R=Arts, entertainment and recreation; 4) K=Financial and insurance activities; 5) Professional, scientific and technical activities; 6) Q=Human health and social work activities.	47
Figure 20 GVA in manufacturing. Top 6 manufacturing sectors: 1) furniture; other manufacturing; 2) food products; beverages and tobacco products; 3) printing and reproduction of recorded media; 4) fabricated metal products, except machinery and equipment; 5) textiles, wearing apparel, leather and related products; 6) chemicals and chemical products.	48
Figure 21 Value added for the leading sectors (some sectors are missing)	48
Figure 22 Scatter diagram of Publications per thousand population vs GERD per capita (€) for EU countries.....	51
Figure 23 Trend in FTE researchers as % of active population in Malta and EU.....	54
Figure 24 Breakdown by sector of FTE researchers as % of active population in Malta and EU	55

Figure 25 BES-funded public R&D in Malta as % of GERD (in €m and % of GDP) and % of GDP	63
Figure 26 BES-funded public R&D as % of GERD and as % of GDP in 2013 in Member States	64
Figure 27 Structural Funds for core R&D activities 2000-2006, 2007-2013 and 2014-2020. We use the categories: 182 (2000-2006), 03 and 04 (2007-2013) and 062 (2014-2020) as proxies for KT activities.	65
Figure 28 CIS survey 2012 – share of enterprises cooperating with academia	66
Figure 29 Co-publications by field 2003-2013 in Malta.	67

List of Tables

Table 1 Main R&I indicators 2012-2014.....	13
Table 2 Comparison of current and target R&D intensity	14
Table 3 Responsibilities of key public bodies with responsibility for R&I.....	16
Table 4 Top R&D sectors contribution to BERD and number of organisations in 2012 (NSO)	18
Table 5 R&D expenditure by organisation employment size class in 2012 (Eurostat Feb 2015).....	19
Table 6 Basic indicators for R&D investments (2014).....	26
Table 7 Key Maltese R&D Indicators.....	30
Table 8 Public Funding from Abroad to the Maltese R&D (in millions of national currency).....	32
Table 9 Summary of research funding bodies.....	35
Table 10 Public funding schemes for R&I.....	40
Table 11 Cost of contracts awarded by type of objects of public procurement	42
Table 12 Bibliometric indicators, measuring the quality of the science base.	50
Table 13 Open access journals by type	58
Table 14 Policy measures addressing structural challenges in Malta.	72

Annex 1 – List of the main research performers

Public

University of Malta.

Malta Aquaculture Research Centre.

Private

Data on private sector research performers is not available

Annex 2 – List of the main funding programmes

Name of the funding programme	Timeline	Budget	Target group
Fusion Programme	ongoing	€1.6m p.a.	Government, HES and BES
R&D 2014-2020	2014 - 2020	Not specified	BES
R&D Feasibility Studies	2014 - 2020	Not specified	BES
Takeoff Seed Fund	2014	€0.1m p.a.	HES, BES
ERDF	2014 - 2020	€72.1m for the 7-year programming period 2014-2020	Government, HES and BES
EAFRD	2014 - 2020	€20.2m for the 7-year programming period 2014-2020	Government, HES and BES
Reach High Postdoctoral Grant Scheme	2015	€2m	Postdoctoral researchers

Annex 3 – Evaluations, consultations, foresight exercises

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Annex 4 – Estimates of R&D expenditure sourced through national funds, structural funds and FP7

National funds incorporate University Funds and the Fusion Programme. The figures used are as follows:

University Funds as reported in Eurostat;

Annual R&D expenditure through the Fusion Programme is not available but the annual budget allocation figures for this programme are used as an approximation of expenditure.

National Funds	2008	2009	2010	2011	2012	2013
University funds €m	7.86	8.12	9.63	10.99	14.47	15.42
Fusion Programme €m	0.70	0.70	0.70	1.10	1.60	1.60
Total national funds €m	8.56	8.82	10.33	12.09	16.07	17.02

R&I expenditure sourced through EU Structural Funds is not available, and is estimated as follows:

Government sector: R&D expenditure on 'Land and Buildings' + expenditure on 'Instruments and Equipment' for this sector as reported in Eurostat;

Higher Education sector: R&D expenditure with source 'direct gov' as reported in Eurostat;

Business enterprise sector: R&D expenditure 'from abroad EC' (Eurostat) – estimated expenditure sourced from FP7 programme (see point 3 below).

These figures are reasonable when compared to R&D projects funded through Structural Funds as reported in the government portal <https://investinyourfuture.gov.mt>

Structural Funds	2008	2009	2010	2011	2012	2013	2014
Government sector €m	0.01	0.15	0.26	0.95	3.76	4.83	5.25
Higher Education sector €m	0.09	0.39	3.36	1.31	3.54	4.57	1.07
Business sector €m	0.00	0.39	0.85	0.68	0.59	0.43	n/a
Total Structural Funds €m	0.10	0.45	3.70	2.94	7.89	9.83	

R&I expenditure sourced through the FP7 programme is not available, and is estimated as follows:

Government sector: very difficult to estimate but most FP7 projects involving government entities were CSA actions rather than research projects. A figure of € 0.15m p.a. was used;

Higher Education sector: R&D expenditure with source 'abroad' EC as reported in Eurostat;

Business enterprise sector: R&D expenditure provided by NSO for FP7 beneficiaries.

The figures for the period 2008-2013 total €8.7m which could grow to about €15-16m by 2017 when FP7 projects will come to an end. This is reasonable in comparison to the figure of €21.2m provided by the EC as the total allocation to Maltese entities through FP7, bearing in mind that the latter figure involves both research and non-research categories.

FP7 Programme	2008	2009	2010	2011	2012	2013	2014
Government sector €m	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Higher Education sector €m	1.42	0.80	0.38	0.46	1.12	1.18	1.59
Business sector €m	n/a	n/a	0.45	0.44	0.81	0.78	n/a
Total Structural Funds €m	1.57	0.95	0.97	1.05	2.08	2.11	

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