Background Quality Report: MOD Research and Development (Expenditure and Employment) Statistics

Section 1: Introduction

1.1 Overview of the statistical output

Statistics on Research and Development (R&D) expenditure are important for a variety of reasons. They provide an important guide to the levels of investment in the economy, are a key indicator of future growth and competitiveness, and allow for international comparisons to be undertaken. The Ministry of Defence (MOD) accounts for around 40% of the UK Central Government spending on R&D.

Defence Economics runs a survey annually to collect data on MOD R&D expenditure. This information is used to report on MOD's R&D to the Office for National Statistics (ONS). The data collection is a legal, EU requirement. The figures are published as National Statistics in the Departmental Resources Statistical Bulletin, and previously in UK Defence Statistics (UKDS), and are forwarded to various other organisations such as the Organisation for Economic Co-operation and Development (OECD) and Eurostat.

The data contributed to assessments against a UK target to spend 2.5% of GDP on Government R&D by 2014. No new target has been set by the current government.

The data is also used within the MOD for monitoring research spending with industry to ensure value for money, and as management information to support responses to PQs and briefings to Ministers by the Defence, Science & Technology (DST) area.

In the Departmental Resources Statistical Bulletin Table 5 the data is presented as a time series to show trends and is broken down by research or development activity and intramural or extramural expenditure. The statistics represent the funder perspective.

Classification
The OECD produces guidance on the categorisation of R&D - the 'Frascati'guidelines - which facilitates comparison of R&D expenditure between countries.

Categorising defence tasks using this scheme is very difficult. The OECD recognise this. In their latest text, they draw attention to the particular problems faced with categorising the early work on major defence equipment programmes. Historically, MOD's R&D figures have been criticised, notably by the House of Lords (HL paper 44:1990) where, in particular, the high spend on development (as opposed to pre-production) was queried. The move to an international accounting standard made this identification even move difficult.

The ONS require that R&D expenditure is also categorised into intramural and extramural elements. For defence, intramural R&D is that undertaken within MOD and Defence Agencies, staffed by civil servants. Extramural R&D is commissioned by MOD with UK industry, institutes of higher education, Research Councils and overseas organisations. Some difficulties arise with these categories as it is not always clear whether or not an organisation should be considered part of the MOD.

History

Measuring MOD R&D expenditure is a long standing requirement which has been ongoing for at least 30 years. The methods used to compile the statistics have been regularly reviewed in light of organisational changes, changes to the accounting system (such as the move from cash to resource accounting), changes to the international classifications or accounting conventions and to ONS reporting requirements. As a result of this there are breaks in the series in 1997 and 2001/02.

Defence Economics have also carried out several audits of compliance with the Frascati definitions and have implemented changes to improve this. Following the most recent data quality review, the data for 2001/02 and 2002/03 was debadged as a National Statistic following advice from the Chair of the UK Statistics Authority. This was because for these years MOD net development expenditure, as defined by Frascati, may have been overstated by up to 40% per year, but insufficient records exist to enable a true estimate to be made.

DASA Defence Statistics Bulletin No.9 presents an overview of the current challenges faced with the application of the OECD definitions to Defence.

Strengths and Weaknesses

The strengths of these statistics include Frascati compliance to allow comparison, presentational clarity and detailed documentation of methods and quality. These statistics have been reviewed regularly to maintain quality and relevance and the data collection has improved in terms of data quality and responder burden reduction.

The main weakness of these statistics is that they are reliant on the correct categorisation of R&D spend by Defence Equipment & Support (DE&S) project teams.

Future Improvements

In order to maintain the quality of these statistics we will need to continue to review them to keep up with organisational changes. The introduction of a set of accounting codes for Frascati compliant R&D from 2016/17 will improve the statistics. This was approved in 2015 by the internal MOD accounting committees (RACE).

MOD has also sought to redefine the Frascati guidelines themselves by seeking amendments from the OECD. This option was rejected on the grounds that it was considered disproportionate to change the international classifications for the benefit of one Department in one member state.

Latest Publications

1. Departmental Resources Statistical Bulletin 2015 - Table 5 (MOD Research & Development Expenditure Outturn).
2. The R&D data that we collect is part of a wider survey by the ONS which is published in the Gross Domestic Expenditure on Research and Development (GERD): here
3. DASA Defence Statistics Bulletin No.9 – Details of the latest review to determine Frascati compliance.
4. Defence Statistics Bulletin No 6 - Details of how R&D would be affected by the move from cash to RAB accounting.
5. Defence Statistics Bulletin No 2 – Details of how R&D statistics were compiled under the old cash accounting system.
6. National Statistics Quality Review – Page 113 onwards provides details of the 2004 Quality Review of R&D statistics

1.2 Producer Information

These statistics are produced by the Defence Expenditure Analysis branch within the Defence Economics Division of the Ministry of Defence (MOD). The responsible statistician for these statistics can be contacted by emailing DefStrat-Econ-ESES-DEA-Hd@mod.uk

Further details about how to contact Defence Economics and Defence Statistics can be found here.

1.3 Summary of method and processes used to compile outputs

Data is sourced from the MOD Chart of Accounts and a survey of Project Teams within Defence Equipment and Support (DE&S), DSTL and Defence, Science & Technology (DST).

The MOD Chart of Accounts is the start point for the exercise. We then carry out a survey of the MOD and its trading funds to find Frascati compliant R&D expenditure. A survey is required because the Chart of Accounts data does not make the distinction between Frascati compliant and non-compliant R&D. The survey returns are compiled and validated by Defence Economics using accounts data.

Further information on current methods can be found in Defence Statistics Bulletin 9.

1. 4 Other Documentation

Defence Statistics Pre-Release Access lists
Defence Statistics confidentiality policy
Defence Statistics revisions policy
Statement of Administrative Data Sources

Section 2: Quality Dimensions

2.1 Relevance: The degree to which the statistical product and underlying data meet user needs for both coverage and content.

The R&D data that we collect is part of a wider survey by the ONS, referred to as the GovERD (Government Expenditure on Research and Development), which is published in the Gross Expenditure on Research and Development (GERD) First Release. The ONS survey results are used in the following ways.

- Production and publication by the ONS of government funding on R&D in its annual 'SET (Science, Engineering & Technology) statistics'.
- Data is supplied to EUROSTAT for the purposes of comparing UK figures relating to R&D with other countries.
- To assess if the UK is meeting its obligations to the European Commission and the OECD.

Internal users of this data include the Defence, Science & Technology (DST) area and the

Directorate of Financial Management. These statistics are used to monitor research spending to ensure value for money and for management information.

The data is also used to answer queries from policy colleagues, parliament and the public. Common Parliamentary Questions and Freedom of Information requests are:

- Historic R&D figures;
- Comparisons to other countries;
- Advice on survey methodology;
- R&D spend as a proportion of the Defence Budget;
- R&D spend on specific defence projects;
- R&D spend with specific companies;
- R&D spend in different technology sectors.

Unmet user needs

We have had requests to supply R&D data broken down by UK regions and/or countries. We have chosen not to meet this request because the UK defence budget has never been allocated or planned on a regional basis and decisions on where contracts with industry are placed are not taken in order to benefit one local economy or industry sector over another.

2.2 Accuracy: The closeness between an estimated result and the (unknown) true value, and the accuracy of the raw data.

The starting point for the production of these statistics is data reported in the MOD resource accounts which are audited by the National Audit Office and meet National Accounts quality standards.

We have assessed the possible sources of error in our survey as follows:

- Coverage Errors: Minimal. We survey all known R&D procurers, using the chart of accounts and information from DST.
- Measurement Errors: Some problems with application of Frascati definition – see 'Classification Issues' below.
- Non-response Errors: Minimal. We check survey non-respondents against central accounting data and chase those who we expect to have R&D spend. A near 99% response rate was achieved for the 2013/14 survey.
- Processing Errors: Minimal. We carry out validation checks to reduce processing errors.

Defence Statistics Bulletins Nos. 2, 6 and 9 provide further detail on the data quality issues surrounding these statistics.

Classification Issues

In 2009 we took steps to improve the accuracy of our raw data by improving awareness of the Frascati definition of R&D, through presentations to finance staff, and ensuring that survey respondents have the necessary information to fill in their survey response accurately. Also in 2009 we created a Frascati Toolkit for commercial/finance staff to act as a self help reference tool to aid survey responders. Amongst other reference material this provides a distillation of the 200 page "Frascati Manual" as well as worked examples for fictitious defence projects. As part of the data validation processes we also contact the key project teams to ensure Frascati compliance. Increased awareness and familiarity with the definition has occurred following several years of carrying out the survey and advising respondents on classifications.

DASA Defence Statistics Bulletin No.9 includes details of the latest review to determine Frascati compliance.

The ONS require that R&D expenditure is also categorised into intramural and extramural elements. For defence, intramural R&D is that undertaken within the MOD and Defence Agencies, staffed by civil servants. Extramural R&D is commissioned by the MOD with UK industry, institutes of higher education, Research Councils and overseas organisations. Some difficulties arise with these categories as it is not always clear whether or not an organisation should be considered part of the MOD.

Revisions

Following the latest quality review in 2009, a number of revisions were made to the data. Our main customers were informed of this and an announcement was made via the Defence Statistics website and through a UK Defence Statistics consultation exercise. The issue was flagged in the following year as part of the commentary for the table.

Corrections to the Departmental Resources Statistical Bulletin 2015 Table 5 will be signposted online and accompanied by notes to the tables or a full Defence Statistics Bulletin. We follow the DASA revisions policy.

2.3 Timeliness and Punctuality: Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the time lag between the actual and planned dates of publication.

Data is collected and analysed to meet the ONS's requirement and timescales for the Government Expenditure on R&D Survey (GoVERD). We meet the ONS team annually to discuss any changes to production timetables and/or reporting requirements. Full details of reporting requirements and deadlines are contained within a Service Level Agreement between Defence Economics and ONS. This SLA was updated during 2013 and now runs until Apr 2016.

Data is published in the GERD about a year after the end of the financial year and the Departmental Resources Statistical Bulletin is published 18 months after the end of the financial year.

There have been no punctuality issues with these statistics.

2.4 Accessibility and Clarity: Accessibility is the ease with which users are able to access the data output, also reflecting the format(s) in which the output is available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.

Defence Economics publish this data through the Departmental Resources Statistical Bulletin, which is freely available on the Defence Statistics website. When published in the past as part of UK Defence Statistics (UKDS), this table received around 80 web hits per month. The data in the 2015 Bulletin can be downloaded in several formats (e.g. Excel and PDF) with the pdf providing commentary and visualisations to support the excel tables along with links to relevant Defence Statistics Bulletins. Three Defence Statistics Bulletins relate to R&D (see latest publications in section 1.1) and these are also available via the Defence Statistics website.

We have received no feedback relating to accessibility and clarity. If you have feedback please contact us.

2.5 Coherence and Comparability: Coherence is the degree to which data that are derived from different sources or methods, but which refer to the same phenomenon, are similar. Comparability refers to the degree to which data can be compared over time and domain.

These statistics are coherent with:

- The MOD resource accounts as accounts data is used to validate the survey responses.
- The ONS Gross R&D survey (GERD) First Release.
- ONS "Science, Engineering & Technology (SET) Statistics".

We use the Frascati definition of R&D spend so that the data collected can be used for international comparisons, such as by the OECD and Eurostat, and also to compare the MOD with other government departments. Some of the issues surrounding the use of the Frascati definition are discussed in DASA Defence Statistics Bulletin No.9 and Section 2.2 – Accuracy.

The R&D data presented in the Departmental Resources Statistical Bulletin 2015 Table 5 is different to the R&D data in Table 3 (Expenditure by Commodity Block) and Table 4 (MOD Equipment Expenditure) which is from accounts data which is not fully Frascati compliant. Further explanatory notes were added to these tables in 2013 to make the differences clearer.

There is also a wider issue with regard to comparisons between the different data collection processes adopted by ONS. Alongside the GovERD, ONS also collect data on business R&D (the BERD). This survey approaches R&D activity from the performers perspective. Data collected by MOD internally and published in the Departmental Resources Statistical Bulletin is taken from the funder perspective. This inevitably results in a "funder-performer" gap in the statistics. ONS are aware that this is a long standing issue but assure us that the differences in statistics can be explained by the fact that companies further down the defence supply chain may not be aware that they are contributing to tasks which have a primary defence purpose. To our knowledge, to date, ONS have not attempted to quantify this "gap".

2.6 Trade-offs between Output Quality Components: Output quality components are not mutually exclusive in the sense that there are relationships between the factors that contribute to them. There are cases where the factors contributing to improvements with respect to one component lead to deterioration with respect to another.

We have made quality improvements that have had an impact on comparability over time, to the extent that there are breaks in the series at 1997 and 2001/02. In order to meet the requirements of ONS, OECD and EU it was judged that improving the quality of the data was of greater benefit than maintaining a time series, particularly as the improved quality resulted in a better comparability between MOD and other Government Departments, and for the UK to be compared with other nations.

2.7 Assessment of User Needs and Perceptions: Users are provided with products and services that meet their needs. The articulated and non-articulated needs, demands and expectations of external and internal users should guide the department.

Users are encouraged to provide feedback on Statistical Bulletins. The further information page contained within each bulletin provides details on how to contact the responsible statistician and there is also the opportunity to do so through the feedback pages on the GOV.UK website. Users can be informed of the latest changes to statistics through the GOV.UK website and through consultation exercises where significant change is proposed.

More informally, we monitor the requests for information that we receive from within the MOD and from outside, and respond accordingly. We have been actively involved in User Engagement and have interacted with the user community on the 'Think Defence' website, who have used our outputs in some of their blogs.

Our current assumptions about users and uses of these statistics are contained in Section 2.1 - Relevance. If you use these statistics in another way please contact us.

2.8 Performance, Cost and Respondent Burden: Resources must be effectively used. The desired outcome must be produced cost effectively. Respondent burden should be proportional to the needs of users and not excessive for respondents.

To minimise the burden on respondents, administrative data sources are used as much as possible: to identify who should be included in the survey and to validate the data received. In order for sufficient data quality and detail, a survey is required. We consulted colleagues in DE&S regarding the burden of filling in the survey and they were satisfied that it could be met within existing resources.

A MOD wide IT system is used to reduce the administrative burden of the survey. The questionnaires and results are saved to a shared area. We have also created the Frascati Toolkit as a self help reference tool to aid survey responders.

2.9 Confidentiality, Transparency and Security: The privacy of data providers (e.g. administrations, enterprises and others), the confidentiality of the information they provide and its use only for statistical purposes must be absolutely guaranteed. The department must produce and disseminate statistics respecting scientific independence and in an objective, professional and transparent manner in which all users are treated equitably.

In producing these statistics, we adhere to the Defence Statistics confidentiality policy. We provide the statistics to the ONS in summary form to prevent disclosure.

We adhere to the principles and protocols laid out in the Code of Practice for Official Statistics and comply with pre-release access arrangements. The Defence Statistics Pre-Release Access lists are available on the Defence Statistics website.

We maintain good links with policy colleagues to ensure that these statistics are understood and prevent misuse. The Departmental Resources Statistical Bulletin Tables 4 and 5 contain commentary explaining these statistics which have recently been reviewed with additional notes of clarification added.