

Thoughts on the Deloitte Report.

Martine J Barons & Noel-Ann Bradshaw for the Big Mathematics Initiative Implementation Group

Overview

The Deloitte Report was commissioned by EPSRC, working with CMS, to provide a way of assessing the economic benefits of Mathematical Sciences Research (MSR) in the UK. MSR is defined as “high-end mathematical research, as carried out by academic institutions, research centres, businesses, individuals and Government that adds to the store of accumulated knowledge”. Deloitte carried out the work using a bespoke mathematical model to approximate the following metrics: direct employment using the Standard Occupational Classification codes (SOC) supplied by the ONS and Gross value Added (GVA) which is the value of output less the value of intermediate consumption and analogous to Gross Domestic Product. The report concludes that MSR underpins¹ the UK economy in 2010 to a value of approximately 2.8 million in employment terms (around 10% of all jobs in the UK) and £208 billion in terms of GVA contribution (around 16% of total UK GVA). Reports for different disciplines used the same methodology², making this comparable. After its publication Deloitte were commissioned to provide an analogous report on ‘Mathematical sciences and their value for the Dutch economy’.

Discussion

The report contains much information that can be usefully quoted in government circles, research or grant applications or by teachers and anyone interested in the popularising of mathematics to the general public. It summarises examples of how mathematics is used to underpin technology, including some of the Maths Matters publications from the IMA. It lists many subfields of mathematics and a range of occupations that require a high level of mathematics. It highlights associated subjects such as uncertainty and optimisation.

It is the nature and training of mathematicians to be diligent about definitions and modelling details. When the report was released, many in the community focused on flaws in the GVA model rather than the overall positive message. Some argued that the outcome for MSR was far too high whereas other sectors and disciplines argued that the methodology used meant their scores were too low. Consequently, the mathematical community failed to capitalise on the positive content, perhaps failing to appreciate they were not the report’s intended audience. HE mathematics/careers departments could have been proactive in getting the message out to students and schools, but it appears that there was little dissemination of the report in a format that was easy for educators to use. In general, schools do not seem very aware of the Deloitte Report emphasising how a fractured mathematical community has failed to capitalise on publicising the overall positive message.

On the other hand, EPSRC references the report under ‘Evidence Sources’ for some of the research areas that fall under its Mathematical Sciences theme. This suggests it may be important for funding applications, both EPSRC and other funds, such as internal funds. There has been widespread reference to the report in mathematics and science community blogs, presentations and documents

¹ A large number of occupations are identified as containing MSR using Standard Occupational Classification and confirmed by a panel of mathematics stakeholders. This is based on a definition of a mathematical science occupation as being ‘directly involved in activities which entail MSR, or directly apply MSR tools and techniques’. See Appendix 2. <https://epsrc.ukri.org/newsevents/pubs/deloitte-measuring-the-economic-benefits-of-mathematical-science-research-in-the-uk/>

² e.g. Life Sciences <https://www.parliament.uk/documents/commons-committees/Exiting-the-European-Union/17-19/Sectoral%20Analyses/21-Life-Sciences-Report.pdf>, high tech manufacture https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/34607/12-1140-industrial-strategy-uk-sector-analysis.pdf

within and beyond the UK, including Australian Mathematical Sciences Institute and on raising the profile of mathematics with the Houses of Commons and the House of Lords.

There is currently some concern that the report is out of date and, in particular, the impact of MSR within the burgeoning data industry has not been evaluated. The report does mention data analytics quoting SAS as saying that the use of algorithms in analysing big data has contributed £25.1 billion to the UK economy in 2011 and forecasts this will rise to £40.7 billion by 2017. Since this date is passed, this strengthens the case for a periodic update or at least a light-touch refresh. Another view is that any new report would soon become out of date and so there could be a case for just using what we already have more effectively. A suitable review would give an up-to date assessment which might be useful and perhaps the mathematical community could capitalise on the positive messages for a range of audiences.

Conclusion

The Deloitte report contains some useful content that could be used effectively with a range of audiences to highlight the national and international importance of the mathematical sciences. It is now out of date and there is a case for periodic update. If this is taken up, there might be a case for commissioning a new report using 2020 date which would be published in 2022, 10 years after the original. In the meantime we could use what we already have more effectively particularly in communicating with schools, universities, funders and government. This could most helpfully be begun with the Mathematical sciences community, both in research and industry, perhaps beginning with the CMS and its constituent bodies. If a new report was commissioned it is essential that:

- a. The MSR community buy into the methodology used and are able to endorse and disseminate the results appropriately.
- b. A communications and dissemination strategy is devised to enable the report to support the community's ambition to be recognised for its contribution to society and to leverage funding as appropriate.
- c. It is made clear from the outset the intended audience for the report and who else could benefit from it if it was written or disseminated in a different way.