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3 June 2021

Dear Amanda

Gaps in the UK's offer to research talent

Thank you for your letter of 28 April seeking advice on the UK's offer to research talent in the context of the R&D People and Culture Strategy.

As you know, the Royal Society strongly supports the Government's commitment to raise overall investment in R&D to 2.4% of GDP by 2027, and to 3% in the longer-term. If the science base is to make effective use of this increased investment and realise the benefits for people and places across the UK, we need a workforce with the necessary skills able to operate at scale in an increasingly competitive global environment.

The UK is not alone in seeking to grow its national science, research and innovation capabilities, and investment in other countries is accelerating in the wake of COVID-19. China, for example, is increasing its annual spend on R&D by more than 7% over the next five years[1], while the USA prepares to invest an additional $250 billion in core science and technology budgets[2]. France has announced that the budget of its National Research Agency will be trebled by 2023, as Spain lifts R&D spending by more than 80% in 2021 and Sweden by 10% up to 2024[3]. Germany meanwhile is making a specific appeal to globally mobile talent through its DAAD programme[4] and an English language website targeted at international researchers[5].

The UK's approach to securing the pipeline of domestic and overseas research talent must be viewed in this global context. It requires an honest appraisal of the gaps in the UK's offer which put us at a competitive disadvantage and a recognition that a purely extractive approach of trying to bring talented people into the UK is unlikely to succeed.

First, we need to look at what is being offered to research talent in other nations and strive to do better. If our offer fails to match or exceed what is available elsewhere – whether on funding, training and career progression, opportunities to innovate or translate research, or on the cost of applying for visas – we risk ceding ground to others. The current precariousness of early research careers across the OECD[6] is one area where raising our offer could have significant impact.

Secondly, the success of the UK's offer depends on us being open and collaborative as a science nation. Numerous studies have shown that international collaboration increases the reach and wider benefits of research activity, and globally mobile scientists will move to countries that give them the best opportunities to work and excel internationally. A singular focus on bringing talent to the UK, while giving insufficient attention to opportunities for outward mobility and collaboration, is a recipe for failure – it will only diminish the UK's attractiveness as place to do research.

Thirdly, we need to avoid separating out investment in the domestic talent pipeline from importing talent from elsewhere. In a globally competitive R&D environment, both are essential for driving up the performance and innovation potential of the science base and should not be seen as an either/or.

The annex to this letter contains a summary of gaps in the UK's current offer to research talent. We will of course continue to engage closely with Government on this agenda and are also supporting UKRI as it develops key principles for attracting and nurturing talented researchers and innovators.

Yours sincerely,

Sir Adrian Smith PRS

Annex: Analysis of gaps in the UK's offer to research talent

1. Ineffective delivery of foundational skills for R&D and other high value economic activity through schools and colleges

The current shortage of suitably qualified specialist teachers reduces the UK's capacity to offer high quality STEM education. According to Ofsted, 26.6% of teaching hours in physics in 2019 were taught by teachers with no relevant post-A level qualifications[7]. At primary level, just 5% of teachers are estimated to hold specialised science degrees and teaching qualifications[8]. A failure to meet teacher recruitment targets in key subjects such as chemistry, mathematics and physics remains a persistent problem[9]. Physics also suffers from a higher graduate attrition rate than other areas of teaching[10].

Recommendation:

- Review incentives for science and mathematics teachers in early career. A cost-benefit analysis found that investing £4 billion in a subject-specific continuous professional development entitlement of 35 hours training per year for every teacher could stop up to 12,000 individuals leaving the profession and boost future earnings of pupils by £61 billion[11].

2. Static PhD offer impacting the talent pipeline

In the last decade, growth in domestic and overseas PhD enrolments in the UK has remained broadly flat[12]. PhD fees for home students are pegged to UKRI fee rates – currently around £4,500 per year – but are typically upwards of £20,000 for non-UK (including EU) candidates in STEM disciplines. In contrast, countries such as Germany, Sweden and Norway charge zero fees irrespective of nationality. Funding in the UK for studentships and structured doctoral training (the latter with industry placements and other professional development opportunities) exists but is in limited supply. The introduction of the income-contingent loans for home PhD students in 2018 appears to have had little impact on participation. Most PhD candidates exit R&D after completing their training and those who stay on are faced with precarious employment.

Recommendations:

- Undertake system wide review of UK PhD funding arrangements and competitiveness.
- Use the findings of the review to develop an active strategy for maintaining capacity and quality in PhD training and studentship programmes.

3. Precarious employment at early to mid-career level leading to a lack of diversity and loss of human capital

The current bottleneck in the supply of talented people versus jobs in R&D limits career progression and leads many individuals to seek stable opportunities outside the sector. Despite identifying a wide pool of exceptional researchers who are eligible for fellowships, funders including the Royal Society can often only support a small number of individuals due to funding constraints. The prevalence of short-term project grants and job contracts for early career academics is a universal problem. Women and those with caring responsibilities are disproportionately affected[13]. A recent survey by Wellcome found that early and mid-career researchers are significantly less likely to feel secure in their job than senior researchers. Concerns around research culture in the UK, including pressure to publish outputs in high volume while maintaining quality, were also cited[14]. Ethnicity data show that Black researchers are leaving STEM in greater numbers than other groups at all stages of the career pipeline[15].

Recommendations:

- Boost the capacity of the higher education and research system to develop and retain talent by increasing quality-related (QR) research funding and providing a greater proportion of the full economic costs of research.
- Provide additional funding to support more exceptional candidates on competitive fellowship and grant schemes.
- Take practical actions to promote diversity and reverse underrepresentation including outreach, networking, mentoring and peer support.

4. Research assessment narrowing the focus of recruitment in higher education and research institutions

The formula used to allocate mainstream QR funding incentivises institutions to recruit staff with peer-reviewed publications that can be submitted to the Research Excellence Framework (REF).

Incentives to recruit talented individuals on open-ended technical or research associate contracts, or at the interface of academia and industry in areas such as collaborative R&D, contract research and SME engagement, are smaller in comparison yet essential for a high performing ecosystem. Research England's block grant allocation for higher education knowledge exchange activity represents a fraction (£230 million or 13%) of the total allocated annually through mainstream QR (£1.776 billion)[16].

Recommendations:

- Review the incentives for recruiting talent including an uplift in core support for higher education knowledge exchange activity.
- Investigate how research assessment can better recognise and reward the full breadth of talented individuals in higher education and research as part of discussions on the next REF.

5. Limited mobility between academia, industry and civil society

Intersectoral mobility supports innovation and is an important tool in increasing the effectiveness of research[17]. The Dowling Review in 2015 found that the UK lags behind countries such as Germany and the USA in encouraging mobility[18], and efforts have been made more recently to bring about changes to research culture, funding and wider system incentives[19].

Recommendations:

- Protect provision for industrial placements within doctoral training programmes and studentships and encourage mobility between academia and other sectors.
- Review and promote opportunities for international researchers to engage with industry.
- Consider how engagement with industry can be better recognised and rewarded as part of the next REF following the example of the Résumé for Researchers[20].

6. Skills gaps and shortages within the technical workforce

An ageing workforce means a high rate of retirement and data suggest a fall in the number of younger workers employed in technical roles[21]. The technician workforce is also hampered by equality, diversity and inclusion issues. In particular, the majority of technicians in the higher education sector are male and the proportion of Black, Asian and minority ethnic technicians is much lower compared to academic staff[22]. The availability of technician skills impacts the UK's attractiveness for inward investment and the ability of businesses to exploit ideas[23].

Recommendations:

- Invest in a new generation of early career technical professionals to be trained in key technologies in colleges, universities, research organisations and businesses.
- Develop new funding options such as technician fellowships to enhance career opportunities and raise the profile of the technical workforce.
- Ensure that equality, diversity and inclusion initiatives cover the technical workforce.

7. A lack of agile and talent-focussed funding to support international collaboration

The Smith-Reid Review identified the absence of funding to support fast-moving opportunities for international collaboration as a major gap in the UK funding landscape[24]. Beyond participating in multilateral schemes such as the Human Frontier Science Program and Marie Skłodowska-Curie Actions, the UK offers relatively little funding for exceptional early career talent and mobility.

Recommendation:

- Deliver the Smith-Reid Review recommendation for the creation of an agility fund to invest in emerging international programmes of significant potential and to capture opportunities that arise unexpectedly. This should be supplementary to existing international funding arrangements including Horizon Europe and part of a wider strategy of investing in areas of shared research strength, innovation and technology, infrastructure, overseas development, and global challenges.
- Create a parallel funding stream specifically to attract and retain global talent and enhance opportunities for international mobility to and from the UK.

8. Uncompetitive researcher mobility offer with the highest immigration costs in the world

Analysis by the Royal Society in 2019 found upfront visa fees in the UK to be up to six times higher than the average of leading science nations[25]. The UK has yet to agree substantial reciprocal deals on international mobility and is the only country in western Europe to require EU, EEA and Swiss researchers to apply for visas.

Recommendations

- Maintain a proactive global outreach and marketing strategy led by government with support from the sector. Messaging should be tailored to different audiences and geographies.
- Seek reciprocal arrangements on inward and outward mobility for researchers and innovators as a priority in post-Brexit trade negotiations.
- Lower upfront immigration costs for visa holders and close family members in line with international competitors
- Continue to expand and simplify the Global Talent visa, with particular emphasis on widening access for early career researchers.

Notes

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[16] Research England (2020), 'Research and knowledge exchange funding for 2020-21', available from https://re.ukri.org/sector-guidance/publications/research-and-knowledge-exchange-funding-2020-21/

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