Call for evidence: Inquiry into Equity in the STEM Workforce

Submission by Oxford Brookes University on women participation as founders of university spinout companies within the HE sector.

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29 January 2021

Introduction

1.The Industrial Strategy has set an ambitious goal for the UK to become the most innovative economy in the world by 2030. This goal is supported by the UK Research and Innovation Roadmap that sets out the government's vision for the country to become a *'science superpower and invest in the science and research that will deliver economic growth and societal benefits'.* The ability to attract, retain and develop diverse researchers and teams is essential for delivering these objectives. Universities play a key role in delivering this vision through (1) the commercialisation of research which contributes to economic growth and (2) by developing and nurturing a pipeline of diverse talented researchers to grow the country's R&D capacity.

2.The evidence and recommendations outlined in this submission are based on a project on Women and Spinouts[1]: A Case for Action, funded by the Engineering and Physical Sciences Research Council (EPSRC) under its Inclusion Matters programme. This project aims to investigate the causes of underrepresentation of women engineers, scientists and mathematicians as founders of university spinout companies and to develop interventions to increase their participation in commercialisation of research. The evidence submitted to this enquiry draws from the project research that has:

- provided an overview of the UK spinout landscape from a gender perspective,
- charted the spinout journey of 35 men and women founders
- explored the perceptions of early career researchers (ECRs), through focus groups at different HEPs attended by 63 ECRs, about commercialisation of research and spinout activities.

Although this project focuses on women, it provides useful insights that can help to develop a more inclusive university spinouts ecosystem, not just for women but also for STEM researchers with other protected characteristics. Full research reports and further information about this project can be accessed at https://www.brookes.ac.uk/women-and-spinouts/

[1] Spinout (or spin-off) companies are broadly defined, by the Higher Education Statistical Agency, as registered companies set up to exploit intellectual property that has originated from within a Higher Education Provider such as a university *https://www.hesa.ac.uk/data-and-analysis/business-community/ip-and-startups*

This evidence is being submitted by Professor Simonetta Manfredi, project director, on behalf of the project team at Oxford Brookes University.

3. Recommendations, informed by our project research findings are outlined below. These are aimed at policy makers in the government and its agencies, the HE sector as a whole and individual Higher Education Providers (HEPs) to develop a more inclusive ecosystem for commercialisation of research and spinouts:

For policy makers

3.1 Develop an EDI framework for data collection that can be applied to HEPs' commercialisation practices and spinouts. There is a need for open source data to understand the actual level of participation of women, BAME and other equality groups (wherever possible) as founders of spinout and their involvement in other activities relating to commercialisation of research. The Knowledge Exchange Framework can be leveraged to provide EDI benchmark data across the sector. This is a starting point to identify what data and information needs to be captured at the institutional, regional and national level. Currently it is difficult to establish and monitor levels of women underrepresentation as the HE-BCI survey, that collects data on spin-off (alias spinouts) from UK universities, does not disaggregate by sex or by any other protected characteristic. Our research showed that women researchers represent only 13% of founders of university spinout companies and are significantly underrepresented in the most senior executive level of these companies (C-Suite).

3.2 Develop a more inclusive spinout ecosystem. It is important to develop and nurture a pipeline of diverse talent across the country as spinout companies can make an important contribution to local economies, especially in the post-Covid recovery. There is significant geographic polarisation of spinout activities. In the whole of the UK 50% of university spinouts are created in the so called 'golden triangle' (universities of Oxford and Cambridge, Imperial College and University College London) and 16% in Scotland. There is also institutional disparity as 70% of all spinouts originate from Russell Group Universities. These disparities limit opportunities for women and scientists with other protected characteristics to spinout, depending on the HEPs they work for and, in which part of the country they are located. This poses significant limitations to the development for a more inclusive spinout ecosystem. Addressing these disparities is of key importance to the government 'levelling up' agenda.

3.3 Increase investments in opportunities for dedicated time to explore commercialisation of research through the ICURe programme (https://innovateuk.blog.gov.uk/2018/04/11/innovation-to-commercialisation-of-university-research-icure/) and entrepreneurial fellowships. Evidence from our research suggests that these opportunities can be instrumental in increasing involvement of women researchers in commercialisation of research and as founders of university spinouts. These opportunities are especially valuable for early career researchers and more could be done to provide a targeted support for this group.

3.4 Tackle gender bias. There is a perception among women founders of gender bias in the investor community which is highly male dominated. These findings resonate with the Rose review of Female Entrepreneurship (2019, https://www.gov.uk/government/publications/the-alison-rose-review-of-female-entrepreneurship) in the general economy. In response to this review HM Treasury has set up the Investing in Women Code initiative (https://www.gov.uk/government/publications/investing-in-women-code) to support the advancement of women entrepreneurship in the UK. There is scope for the HE sector to engage with the investors who have signed up to the code and encourage them to provide specific funding opportunities for women researchers to commercialise their research. This would also broaden the investment base for university spinout companies.

For Higher Education Providers

3.5 Provide greater visibility for women who successfully founded university spinout companies to inspire other women researchers to explore commercialisation of their research. Greater visibility of women founders would also help to tackle stereotypical views of women scientists, mathematicians and engineers. Build on examples of good practice from Innovate UK, such as the Women in Innovation Award as well as regional initiatives such as the Female Academics Forum for Entrepreneurship led by the University of Nottingham in collaboration with other universities (https://exchange.nottingham.ac.uk/events/female-academic-forum-for-entrepreneurs/). There is also scope to leverage initiatives such as Athena SWAN and the Race Equality Charter to ensure streamlined collection of EDI data within HEPs to promote initiatives to advance equality in commercialisation of research and in the spinouts ecosystem.

3.6 Facilitate access to alternative academic career paths in R&I. It is important to develop, from an EDI perspective, a better understanding of academic careers within the R&I landscape focusing on opportunities for alternative career paths and for working across sectors (e.g. industry, NGOs, policy departments). ECRs provide a pipeline of future scientists and founders of spinouts and start-ups. Evidence from our work suggests that they can play a leading role in the creation of spinouts. Opportunities for younger scientists may be hindered by being in fixed-term precarious employment. It is recognised however, by the Concordat to Support the Career Development of Researchers, that there may not be enough opportunities for permanent employment within academia. Therefore, it is important to think creatively about career opportunities to retain talent in STEM.

3.7 Address the tension between commercialisation of research and spinout activities and other aspects of academic work. There is a tension between commercialisation of research and spinout activities and the other demands arising from an academic job. This affects both men and women but it can be more of a challenge for researchers with caring responsibilities. In line with the aims of the Knowledge Exchange Concordat and the Knowledge Exchange Framework HEPs ought to ensure that activities relating to the commercialisation of research are appropriately resourced within individual academics' work-load plans. Linked to this it HEPs should make it clear how these activities are recognised and rewarded in promotion processes.

3.8 Foster more diverse networks of expertise. Networking between business and academia plays a key role in commercialisation of research. HEPs Technology Transfer Offices should seek out diverse talent to extend existing pools of business advisers and potential board members for spinout companies.

4.Women and Spinouts: A Case for Action Key Insights

The evidence highlighted below is based on the Women and Spinouts: A Case for Action project funded by the EPSRC under its Inclusion Matters programme. This project started in November 2018 and it is expected to be completed in April 2021. The research involved collection of both quantitative and qualitative data, through interviews and focus groups, and provides useful insights into the participation of women researchers in STEM spinout leadership. This research presents limitations as the data set used only allowed for a binary definition of gender and it was not possible to extrapolate any information relating to ethnicity or other protected characteristics save for age.

Question 1 What are the demographics of STEM workers in your organisation or sector? Are there gaps in the quality of evidence, monitoring or reporting?

5.Lack of diversity data about spinout founders. Currently there is no open source data to monitor the participation of women researchers in STEM as founders of university spinout companies or in other leadership roles in the C-suite. The BC-HE survey that collects data on spinout (the survey uses the term spin-off) does not disaggregate neither by sex nor by any other protected characteristic. For the purpose of our project in order to analyse women researchers' participation as spinout founders and in the C-suite we acquired a data set from Beauhurst (https://www.beauhurst.com), a company that provides a searchable database of the UK high growth companies. Based on the Beauhurst's data set of university spinouts (at January 2019), an analysis was conducted on 789 of these companies, identified as active and at different stages of evolution, across the whole of the UK. Some of the key results from this analysis (Humbert and Griffith, 2019 https://www.brookes.ac.uk/women-and-spinouts/) shows that:

- Only 13% of these companies had at least one woman founder.
- On average, spinouts have 4.6 individuals in the C-Suite consisting of 4 men and 0.6 women.
- The number of women founders, when controlling for other factors, is negatively associated with both receiving a large innovation grant and featuring in a high-growth list.
- From the data available it was not possible to extract any information about ethnicity of spinout founders.
- There are significant geographical disparities: most spinouts activities are concentrated in the so called 'golden triangle' that has produced 50% of all spinouts in the UK and in Scotland that has produced 16% of all spinouts in the UK. Spinouts from Welsh institutions are less likely to receive equity funding.
- There is also institutional disparity as 70% of all spinouts originate from Russell Group Universities.

- Both geographical and institutional disparities further reduce opportunities for women and other diversity groups to commercialise their research, create spinouts and, broadly speaking, participate in knowledge exchange activities that contribute to the Knowledge Exchange Framework (creation of university spinouts is one of the metrics used by KEF).

Question 2 Where is there inequity across the different protected characteristics and how are different communities impacted across: type of STEM activity commercialisation of research.

6.There is a lot of interest about university spinouts as they can make a significant contribution to local economies and to the UK science base. There is a tendency however, to focus on the processes of establishing spinouts, investments, growth and HEPs policies on intellectual property. While these are important considerations, in order to develop a more inclusive spinout ecosystem it is important to focus on people, the STEM researchers themselves, and understand what motivates them to engage with commercialisation of research and how best to support them. There is a lot to be learned from the experiences of successful founders and their spinout journey (Griffith et al., 2020 summary and full reports available at https://www.brookes.ac.uk/women-and-spinouts/). Below are some of the key findings from 35 interviews with founders (20 women and 15 men) that can develop a more inclusive spinout ecosystem, not just for women but also for researchers with other protected characteristics.

6.1 Motivation to spinout. Men and women founders share similar motivations of wishing for their research to have practical applications to address 'real world problems' and benefits individuals and society.

6.2 Spinout founders' career stage. It should not be assumed that spinout companies are established by researchers in senior academic roles, i.e. professors. Creating a spinout can happen at different stages of a researcher's career. It is not uncommon for early career researchers, shortly after their PhD completion, or even before then, or while in a more junior role (e.g. post-doctoral research assistant or research fellow) to become involved in spinout creation. In our our sample of interviewees, the majority of women co-funded their spinout at the beginning of their career. The intersection of age and gender possibly explains why some of these women found it more difficult to gain support from their institutions, especially with patenting, as they might have been seen as too young and lacking credibility.

6.3 Gender stereotypes. Some women reported being subjected to gender stereotypes. Examples of these related to their appearance and expectations to fit a stereotypical and unfeminine image of a woman scientist, or even questioning their scientific credibility. Although the evidence on BAME women was scant there were suggestions that gendered stereotypes may intersect with racial profiling, exacerbating the situation for women researchers from different ethnic backgrounds.

6.4 Gender bias in the investors' community. There is a perception among women's founders of gender bias in the investors' community which is highly male dominated. Some

reported negative experiences when pitching for funding. Similar findings have been reported by the Rose review of Female Entrepreneurship (2019) in the general economy.

6.5 Lack of role models. There is a lack of role models of successful women founders and relatable mentors to inspire women to commercialise their research and to support them in their spinout journey.

6.6 Perceived legitimacy of commercialisation of research and spinouts within academia. There is a perception that academic entrepreneurship and commercialisation of research may not be properly recognised in academic promotions. There seems to be a pervasive culture in academia which places a lot of emphasis on traditional research and publications at the exclusion of commercialisation of research activities. It is important that institutions recognise the value of these activities, as a woman founder highlighted, *"a lot more people would do this if it was better recognised in promotions".* Institutions need to communicate clearly how they value these activities and there may be scope for thinking more creatively about different career paths.

6.7 Work-life balance. Researchers engaging with spinout activities seem to be expected to do this over and above their normal academic job which is linked to the point above. Tension between "time commitments to the university academic work and work associated with a USO [university spinout]" was also highlighted by a previous study, profiling UK university spinouts (Hewitt-Dundas, 2015 https://www.researchgate.net/profile/Nola_Hewitt-Dundas/publication/280305603_Profiling_UK_University_Spin-outs/links/55b0d1bb08ae32092e073185.pdf). This tension represents a significant challenge, especially for women who tend to have greater caring responsibilities. For spinout founders this can be also compounded by a culture where the business should take priority over personal lives.

6.8 Pathways to spinout companies. Our findings show that there can be different pathways to spinning out a company. It is important to raise awareness among researchers about these different pathways so that they can chose what is more suited to their needs.

6.9 Institutional support and the role of University Technology Transfer Officers (TTOs). The role of TTOs is crucial in supporting commercialisation of research and spinouts creation. TTOs provide a bridging function between academia and business and offer mentors and business expertise from their networks. These however, often reflect the highly male dominated environment of the business community. There is scope for TTOs to foster more diverse networks of expertise from the business community.

Question 3 Where are there evidenced best practice inclusive behaviours and policies with different organisations, subsectors, sectors, and countries on a) recruitment and/or b) retention.

7. As part of our project we carried out 12 focus groups in eight institutions across the UK with a total of 63 ECRs from a range of STEM disciplines. It is important to focus on this

group as they represent the future STEM workforce pipeline. Key insights from the focus groups are highlighted below.

7.1 Precarious careers. Many ECRs are employed on fixed-term contracts which may prevent them in getting involved with commercialisation of research as deemed to be too risky, or because they are focused on finding the next job. VISAs represents another layer of complications for international ECRs. Although UK legislation has tried to make it easier for this group to pursue entrepreneurial activities there is still a lot of uncertainty and lack of knowledge and understanding about what is permitted. There is a serious risk of losing younger and international talent as a result of job precariousness and lack of clear understanding of VISA rules.

7.2 General lack of awareness and understanding of commercialisation of research, including spinouts and how these differ from start-ups.

7.3 Good practice. Opportunities to take part in the ICURe Innovation to Commercialisation programme that provides up to £35K of funding from Innovate UK for researchers to 'get out of the lab' to validate their ideas in the market place and entrepreneurial fellowships were instrumental to support women researchers in engaging with commercialisation of research and spinouts creation. Our findings suggest that these funding opportunities focused on commercialisation of research can be especially helpful to early career researchers.

8. Conclusions

If the UK is to achieve its ambition of becoming a 'science super power' it needs to tackle inequalities in the STEM community and develop an inclusive innovation ecosystem that captures the benefits of diversity. At the beginning of this submission we have offered a range of recommendations based on the findings from our project that we hope will be useful to inform future action and advance equality in the STEM workforce.