

# Exploratory analysis of researcher behaviour challenges the assumption that STEM subjects are more societally useful than SSH.

 [blogs.lse.ac.uk/impactofsocialsciences/2013/10/28/challenging-assumptions-stem-vs-ssh/](https://blogs.lse.ac.uk/impactofsocialsciences/2013/10/28/challenging-assumptions-stem-vs-ssh/)

10/28/2013

Using a database with information on over 1,500 researchers, statistical analysis was recently undertaken to test the hypothesis that technical STEM subjects were more societally useful than social science and humanities (SSH) subjects. [Paul Benneworth](#) describes the research process and the findings which suggest SSH research is just as useful as STEM research. A less stereotypical understanding of impact is required to maximise investments and create benefits for society as a whole.



Anyone active in research cannot help but notice increased recent pressure from research funders to maximise its wider societal benefits. Ensuring public benefits in return for funding is clearly reasonable in a democratic society, but this increasing drive for impact has brought with it a rather undesirable set of policy assumptions, prejudices and stereotypes of which research creates public benefit.

These assumptions affect how policy decisions regarding research funding in general, and specifically the treatment of different disciplines. Recent [Horizon2020 programme](#) discussions perfectly exemplify this, purporting to focus research on 'grand societal challenges' whilst framing those challenges almost exclusively in technical terms. This has the effect of making social science and humanities (SSH) research seem peripheral, with no intrinsic societal value beyond helping other technical disciplines solve their own important problems.

This belief in science, technology, engineering and mathematics (STEM) disciplines' superior societal benefits over SSH might well be true. But there is much evidence that SSH research is societally useful, including Jonathan Bate's highly engaging edited collection on [The public value of arts and humanities research](#) and Alan Hughes *et al.* [Hidden Connections](#) report. So we can't take as axiomatic that STEM is more societally useful than SSH: there is a *prima facie* case that this assumption demands further rigorous testing.



Image credit: Kiran Foster (CC-BY)

This is the background for research I undertook together with colleagues at [CSIC-Ingénio](#) in Spain, published earlier this month in [Science and Public Policy](#) [pdf]. Our argument was quite simple – if SSH research was less useful than STEM research, then you would expect there to be fewer people that found that research useful. In that case, you would also to see expect differences in the behaviours of SSH researchers in response to less user pressure. To try to understand these differences, we reviewed policy and scholarly literature to identify the “claims” that were made about differences between STEM and SSH.

Some kinds of differences would claim that STEM is more useful than SSH, for example that SSH has difficulties in giving concrete answers to user questions. But other kinds of difference suggest instead that SSH is equally useful but is different in the way it engages with its users to STEM research. STEM user interactions often take place within (more easily countable) contractual relationships, but the fact it is difficult to count SSH researchers' non-contractual knowledge exchange relationships does not mean *a priori* that they are less useful.

On that basis, we designed a set of eight hypotheses, four corresponding to the claims that we found in the literature that STEM was more useful than SSH research (1-4), and five corresponding to claims that STEM was simply

differently useful to SSH research (5-9).

**Table 1** Summary of the hypotheses

STEM is more useful than SSH	H1. The rate of involvement with national users compared to international users is higher for SSH researchers than for STEM researchers.
	H2. SSH researchers experience a lower demand for their research than is correspondingly the case for STEM research.
	H3. SSH researchers have less interest in checking the validity and applicability of their research than STEM researchers.
	H4. SSH researchers are more concerned with the pursuit of fundamental understanding whereas STEM researchers are more focused on considerations of use.
STEM is differently useful to SSH	H5. SSH researchers use a lower proportion of formal pathways to interact with non-academic actors compared to STEM researchers.
	H6. SSH researchers spend more time in popularisation activities than STEM researchers.
	H7a. SSH researchers collaborate less with firms than STEM researchers.
	H7b. SSH researchers use fewer pathways collaborating with firms than STEM researchers.
	H8a. The frequency of collaborations with government agencies compared to firms is higher for SSH researchers than for STEM researchers.
	H8b. SSH researchers use more pathways collaborating with government agencies than STEM researchers.
	H9a. The frequency of collaborations with non-profit organisations compared to firms is higher for SSH researchers than for STEM researchers.
	H9b. SSH researchers use more pathways collaborating with non-profit organisations than STEM researchers.

*Source: Olmos Penuela et al., 2013*

We operationalized these variables to permit tested using the IMPACTO database, a survey of researchers at all levels in the Spanish *Consejo Superior de Investigaciones Cientificas* (CSIC) organisation. CSIC funds Spanish public research laboratories in all fields, and the questionnaire covered their research profile and activities, their relationships with non-academic users, obstacles to engagement and engagement outcomes. The survey covered 37% of the 4200 CSIC researchers across all disciplines, with only agricultural sciences over-represented in the survey.

The precise mechanics of operationalization are described in the paper: for all hypotheses, a null hypothesis was constructed that STEM and SSH performed similarly, and tested for significant evidence for rejection. For all but H4, simple categorical data was tested using a U-test. For H1, for example, the variable of national orientation was constructed on the basis of the relative intensity of their reporting of working with different kinds of users in Spain and abroad in the previous 3 years, as a ratio of national: international users.

For H4, scientists were allocated an identity category along two dimensions, the extent to which they pursued excellence in research and impact respectively, following *Stokes' categorisation*. This gives four categories, and null hypothesis was tested that the distribution of identities would be the same in these categories for SSH and STEM researchers, tested for significance with a  $\chi^2$  test. The results of those statistical tests are summarised in table 2.

Table 2 Results of the statistical analysis of the hypotheses

Category	H#	Brief Description	Result/Significance
STEM is more useful than SSH	H1	Orientation to national rather than international engagement	SSH>STEM***
	H2	Research focused on demands articulated by users	SSH=STEM
	H3	Feel a pressure to externally validate their research findings	SSH=STEM
	H4	The distribution of researcher identities in Stokes' categorisation	SSH=STEM
STEM is differently useful to SSH	H5	More likely to use formal user interaction routes	SSH<STEM***
	H6	Propensity to engage in popularisation activities	SSH>STEM***
	H7a	Propensity to work with firms as users	SSH<STEM***
	H7b	Intensity of working with firms as users	SSH<STEM***
	H8a	Propensity to work with governmental organisations as users	SSH>STEM***
	H8b	Intensity of working with governmental organisations as users	SSH>STEM***
	H9a	Propensity to work with non-profit organisations as users	SSH>STEM***
	H9b	Intensity of working non-profit organisations as users	SSH>STEM***

Note: \*\*\* indicates significance at the 1% level

Source: derived from Olmos et al. (2013).

The results are quite dramatic: for all the 'differently useful' variables, SSH researchers behave demonstrably differently to STEM, being more likely to engage in informal interaction (e.g. temporary placements, serving on committees or professional meetings), popularisation, and work with government and non-profit organisations. Conversely, STEM researchers are more likely to use formal interaction (contract research, spin-offs, patents, shared infrastructure) and much more likely to work with firms.

For the variables which suggest STEM is more useful than SSH, only one is statistically significant, an orientation towards engaging with national over international users. The other three all suggest that SSH researchers behave in ways that suggest their research is just as useful to society as STEM researchers. And contrary to Hughes, we found no difference in academics' engagement identities between SSH and STEM researchers, and certainly no evidence SSH were more oriented than their STEM colleagues towards blue-skies, 'ivory tower' research. Even the first result could perhaps be interpreted that SSH researchers are more likely to ensure their research is used for national benefits than STEM researchers.

We appreciate that our research is exploratory, drawn from a single country, and testing an existing database rather than undertaken specifically for our hypotheses. Nevertheless, our research gives us no evidence to simply dismiss our case that the policy-makers' are making a false assumption. Of course, we aren't claiming that SSH is always as useful as STEM research, just that we have evidence to challenge this policy-makers' *a priori* assumption.

A gut feeling might tell you that shiny spin-off companies are more valuable for society than academics working with community groups, but a gut-feeling is no basis for effective policy-making. A less stereotypical understanding of how researchers create impact is clearly urgently required to help policy-makers and researchers work together more effectively, and maximise these massive investments to create benefits for society as a whole.

*Note: This article gives the views of the author, and not the position of the Impact of Social Science blog, nor of the London School of Economics. Please review our [Comments Policy](#) if you have any concerns on posting a comment below.*

## **About the Author**

**Paul Benneworth** is a Senior Researcher at the [Center for Higher Education Policy Studies](#) at the University of Twente, the Netherlands. Paul's research concerns the relationships between universities and society, valorisation, innovation and regional development. He is the editor of [Universities and Regional Development](#) (Routledge, 2012), [University engagement with socially-excluded communities](#) (Springer, 2013), and the [Social Dynamics of Innovation Networks](#) (Routledge, 2014, forthcoming). He tweets as [@heravalue](#).

- Copyright © The Author (or The Authors) - Unless otherwise stated, this work is licensed under a Creative Commons Attribution Unported 3.0 License.