



Populating the science-policy co-production space: academic and policymaker perspectives on knowledge exchange

Taran Thune, Ingvild Reymert, Magnus Gulbrandsen & Erlend Simensen

To cite this article: Taran Thune, Ingvild Reymert, Magnus Gulbrandsen & Erlend Simensen (2023) Populating the science-policy co-production space: academic and policymaker perspectives on knowledge exchange, *Studies in Higher Education*, 48:5, 733-746, DOI: [10.1080/03075079.2023.2187772](https://doi.org/10.1080/03075079.2023.2187772)

To link to this article: <https://doi.org/10.1080/03075079.2023.2187772>



© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 15 Mar 2023.



Submit your article to this journal [↗](#)



Article views: 361



View related articles [↗](#)



View Crossmark data [↗](#)



Populating the science-policy co-production space: academic and policymaker perspectives on knowledge exchange

Taran Thune^a, Ingvild Reymert^b, Magnus Gulbrandsen ^a and Erlend Simensen ^a

^aTIK Centre for Technology, Innovation and Culture, University of Oslo, Oslo, Norway; ^bOslo Business School, Oslo Metropolitan University, Oslo, Norway

ABSTRACT

In this paper, we seek to provide a fresh perspective on knowledge exchange by addressing both academics' and policymakers' experiences with such exchange. Through two large Norwegian surveys of academics and policymakers, we look at the characteristics of the academics that are engaged in various forms of knowledge exchange with policymakers – and vice versa – as well as the channels and mechanisms of knowledge exchange seen from both sides. Through comparing the patterns that emerge in the two studies, we discuss how this exchange arena, which we conceptualise as a 'co-production space' involves a small number of individuals with similar experiences and practices that set them apart from their peers.

ARTICLE HISTORY

Received 30 January 2023

Accepted 3 February 2023




KEYWORDS

Academic engagement; knowledge exchange; co-production; science-policy interaction; collaboration between higher education institutions and government organisations

1. Introduction

'Policy decisions should be based on scientific knowledge and evidence' is a widespread conviction. Similarly, universities and academics are expected to collaborate with and disseminate scientific knowledge to users outside academia. Anticipations and incentives for promoting knowledge exchange are thereby shared, and understanding knowledge exchange and the use of scientific knowledge in policy processes is of great interest for policymakers and academics alike. But who are the individuals involved in knowledge exchange between academic institutions and public policymaking organisations, and how do they interact?

Despite considerable interest in university-society collaboration, limited attention has been paid to how academics exchange knowledge with the public sector compared to how they interact with industry. Policy organisations are expected and often legally required to use scientific knowledge to inform policy and to design and implement programmes and practices (Christensen and Holst 2017; Greenhalgh, Howick, and Maskrey 2014; Head 2016). The public policy context is therefore well-suited for investigations of knowledge exchange, and it has received considerable interest in public administration research (Head et al. 2014; Cherney et al. 2015; Squires et al. 2011; Contandriopoulos et al. 2010). Knowledge exchange is an interactive process involving different activities and multiple stakeholders with different preconditions and interests, which shape exchange experiences and outcomes. Few studies investigate knowledge exchange from the perspectives of both academics and stakeholders outside the academe (Ankrah et al. 2013; Bekkers and Freitas 2008).

CONTACT Taran Thune  t.m.thune@tik.uio.no  TIK Centre for Technology, Innovation and Culture, University of Oslo, PO Box 1108 Blindern, 0317 Oslo, Norway; Magnus Gulbrandsen  magnus.gulbrandsen@tik.uio.no;  TIK Centre for Technology, Innovation and Culture, University of Oslo, Oslo, Norway

© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

Literature on this topic is largely empirical, but theoretically, knowledge exchange can be seen as a form of ‘co-production’ (Ostrom 1996; Jasanoff 2004; Bandola-Gill, Arthur, and Leng 2022). There are multiple meanings of co-production, often referring to joint creation of knowledge that is credible, legitimate and relevant to decision-making (Bandola-Gill, Arthur, and Leng 2022). This long-term form of collaboration and networking can be particularly relevant for dealing with society’s complex challenges (Keast and Mandell 2014; Brown and Keast 2003).

The aim of this paper is to understand the process through which such knowledge emerges, paying attention to knowledge exchange practices in networks that span academic and policy contexts. We explore *who* are involved from the academic and policymaker side in such practices (actor perspective) and *how* knowledge exchange occurs in this context (practice perspective).

By addressing these questions, we aim to make three contributions to the literature on academic knowledge exchange. First, the paper adds by focusing on how academics interact with policy-making organisations in particular. Second, we emphasise that knowledge exchange is dependent on the involvement and interaction of both academics and external partners, while a lot of the literature investigates only academic participants and their activities. The paper therefore contributes by bringing closer attention to the ‘user side’ of knowledge exchange and by investigating both ‘producers’ and ‘users’ of scientific knowledge. Third, by addressing collaboration and interaction as a ‘co-production space’, we illuminate relatively exclusive and deeply embedded networks between academics and policymakers.

Empirically, we use two surveys carried out in Norway. The first investigated academics’ participation in knowledge exchange activities, while the second studied government officials’ access to and use of scientific knowledge in policy work. We investigate characteristics of individuals actively involved in knowledge exchange to look for commonalities between the groups and whether they differ from their respective peers. The analysis of actors and interaction practices is a qualitative and reflexive comparison of the broader patterns that the findings from the two investigations tell us. This allows us to characterise in more depth the co-production space between universities/colleges and government organisations.

The paper is structured as follows: we first review relevant literature focused on distilling key insights rather than a comprehensive review of all possibly relevant studies. In part 3, we outline data sources and methods, and in part 4 we present empirical results from the surveys and make a qualitative comparison. In part 5 we discuss findings and emphasise how they provide a special picture of co-production.

2. Knowledge exchange and co-production in academic – policymaker networks

The literature on knowledge exchange between academics and policymakers is fragmented across several research fields with limited cross-citation and overlap. Here, we highlight some key insights from empirical research on academic knowledge exchange, policymakers as users of scientific knowledge, and a co-production perspective.

2.1. Knowledge exchange – academic and policymaker perspectives

Questions about academic knowledge exchange have been a major research interest within science and innovation studies for decades (e.g. Perkmann et al. 2013, 2021). Different strands of literature tend to tackle questions of knowledge exchange from one specific vantage point, addressing only the perspectives of academics, firms or policymakers. In the science policy and higher education literatures, the roles and experiences of academics are usually the empirical object (e.g. Abreu and Grinevich 2013).

Under the generic term university-industry collaboration, the early literature looked particularly at the prevalence and types of knowledge exchange activities among academic staff, the contextual conditions that shape exchange and collaboration, and the outcomes of such activities in firms (Perkmann et al. 2013). Much of the early literature focused on technical and natural sciences, elite research universities and what may be termed commercial forms of exchange such as technology

transfer, firm formation, industry collaboration and academic entrepreneurship (Nelson & Rosenberg, 1994).

Broader, population level surveys found that such activities are rather uncommon in the academic population, but that external interaction generally is widespread and takes many forms (Abreu and Grinevich 2013; Olmos-Peñuela, Castro-Martínez, and D'Este 2014). Some activities are concentrated in a few scientific disciplines (technology transfer, patenting), whereas others are common in all fields (R&D collaboration, networking, knowledge dissemination). The broader empirical foundation substituted terms like 'university-industry relations' and 'technology transfer' with 'knowledge exchange' and 'academic engagement' (Perkmann et al. 2021).

In this literature, it is acknowledged that collaboration and knowledge exchange with public organisations is common among academics, in some settings more than industry collaboration. Still, only a small share of the science policy literature has investigated policy as a context for academic knowledge exchange, leading to limited understanding of how policy makers access and use scientific knowledge (Abreu and Grinevich 2013).

This is a key topic in public administration research that emphasises how scientific knowledge is used in policymaking rather than the general exchange with academia (e.g. Bédard 2015; Ouimet et al. 2009). A main theme is how sources of scientific and technical knowledge are integrated with other forms of knowledge, as well as the many stakeholders involved in policy processes, including intermediary organisations and lobbyists alongside scientists. This literature highlights that there are multiple uses of scientific knowledge in policy, and that the direct influence of scientific knowledge on policy decisions is rare (Amara, Ouimet, and Landry 2004).

The early literature on use of scientific knowledge in public policy often addressed individuals and roles (Contandriopoulos et al. 2010), assuming that it is possible to distinguish between roles in the process of accessing and using knowledge. Empirical investigations found that frequent users of scientific knowledge in policy share certain characteristics like a high level of education, senior position and expressing that science is valuable (Head et al. 2014; Cherney et al. 2015). They also play important roles in the circulation of scientific knowledge within their organisations (Crona and Parker 2011) and often depicted as boundary spanners (Tellmann and Gulbrandsen 2022).

Both the research policy and public administration literatures pay close attention to the individuals involved in knowledge exchange, considering important contextual conditions that influence their opportunities to engage in such activities. An alternative outlook is shared spaces between academics and policymakers and pay attention to the practices and processes of knowledge exchange found here (Bednarek et al. 2018).

2.2. Co-production perspectives on knowledge exchange

Co-production is a perspective that integrates central themes from both academic engagement and user uptake of research, and it is therefore highly relevant as a theoretical foundation for our analysis. Recent literature reviews highlight how co-production has different 'meanings' (Bandola-Gill, Arthur, and Leng 2022) or contains various 'conceptual lenses' (Bremer and Meisch 2017). A common theme is how collaboration and networks develop and play out related to societal issues (see Keast and Mandell 2014; Brown and Keast 2003), and co-production has been central especially in studies of health, education, and environmental policies. It has been used to understand settings where policies (or other outcomes) involve longer-term contributions from and interactions between different stakeholders, for example policymakers and academics.

There is a main difference in the co-production literature between a descriptive and a normative approach. Descriptive studies investigate how social order is constructed through an interaction that leads to stable and persuasive knowledge (Jasanoff 2004). Normative approaches often take as a starting point that policies and contemporary societal challenges *require* synergistic interaction with academics or other stakeholders (Ostrom 1996). A core emphasis is on the extent of and barriers

towards interaction, based on an assumption that the use of academic knowledge in policymaking needs to be promoted (Lemos et al. 2018).

A normative perspective on co-production is therefore closest to the literature on knowledge exchange. What co-production adds is that it represents a simultaneous analytical framing and a practical strategy, and an emphasis on multiple levels from policy fields to individuals (Bandola-Gill, Arthur, and Leng 2022). In this literature there is also a call for a better understanding of what individuals from both sides of the boundary between different sectors or organisations do when they engage in interaction (Bremer and Meisch 2017).

A few earlier investigations have looked at academia-policy interaction from both sides (Head et al. 2014; Cherney et al. 2015). These have found that the most important practices in the co-production space are participation in meetings, informal contacts, personal networks, commissioning of research reports and participation in advisory bodies. Policymakers mostly indicate that they engage in these forms of contact more frequently than the academic respondents. In addition, these investigations highlight the importance of informal means of interaction and indirect sourcing of scientific knowledge via colleagues and broader policy networks. Still, there is only a limited number of investigations from both academics and potential users that look beyond specific research partnerships, which our paper can shed some light on.

Based on the knowledge exchange, knowledge use and co-production literatures, we draw some key insights for our empirical study. First, there are extensive but loose networks between academics and policymakers. Second, a considerable proportion of academics are involved in different forms of knowledge exchange with policymakers and most policymakers relate in one way or the other to scientific knowledge as part of their work, but it is unclear how they do it and to what extent they are active participants or merely 'recipients'. Third, there are individuals and communities that form persistent networks that we label 'co-production spaces', where knowledge exchange is common and where we may assume that knowledge exchange practices of different kinds are pervasive. Our goal in this paper is to understand these 'spaces' of knowledge exchange actors and activities.

3. Methods and data

To explore who they are and how academics and policymakers exchange knowledge, we use data from two large surveys among academics and government officials that included multiple questions about knowledge exchange activities.

3.1. The two surveys

The survey among academics was administered in 2014 to the whole population of tenured academic staff in all Norwegian universities and university colleges (4182 responses and 52.5% response rate). The survey contained several questions about academics' collaboration with external stakeholders including channels of interaction, motivation and outcomes.

Although the data set is around eight years old, it is a comprehensive, full population survey where many analyses of aspects like time use, engagement activities, funding and interaction show remarkable similarity to data from one and two decades earlier (see e.g. Thune et al. 2016). For our purpose of comparing the wider picture of engagement patterns across two organisational settings, the 2014 survey remains highly relevant and useful, and its questions were also one source of inspiration for the government official survey.

The survey to government officials was distributed to all employees in all ministries (14 in total) and seven selected non-ministerial government agencies in Norway in 2019. It may be regarded as a population survey in the ministries (1609 responses main survey and 277 from pilot survey, 28% total response rate), targeting employees that reported that they had consulted research in the past twelve months. The findings are likely widely relevant, yet Norway seems to be one of very few

countries where such individual-level data can be collected, making the comprehensive dataset unique.

Tables 1 and 2 provide an overview of key variables and descriptive data in both surveys.

3.2. Analysis

The analysis proceeded in three steps. First, we investigated the data from the academic survey with bivariate analyses to uncover the range, types and degree of interaction between academics and governmental officials. We then conducted multiple binominal logistic regressions¹ with ‘cooperation with governmental organisations’ as the dependent variable. This enabled us to identify individuals that were actively involved in knowledge exchange with policy organisations and how they differed from their peer group. Independent variables in these regressions were gender, age, institutional type, academic discipline, non-academic work experience and external funding.

Second, we analysed the answers from governmental officials to identify those actively involved in knowledge exchange with academic partners. However, as government officials are unlikely to be part of collaboration agreements with universities and academics directly, we did not use collaboration as a dependent variable in this analysis. Instead, we used sourcing or acquiring scientific knowledge from academic institutions as the dependent variable.² In the multiple binominal logistic regression, we controlled for level and field of education, position, work responsibilities/tasks, type of organisation and prior work experience to compare the group that most actively participated in knowledge exchange, with their peers.

The results from the two analyses can be used to understand which actors participate in the co-production space between policy and research and how they do it. Our data does not enable us to combine that data in one statistical analysis. Thus, in the third step, we performed a qualitative comparative analysis to explore knowledge exchange behaviour from a two-sided perspective. Informed by theory and based on the results in the two studies, we made a ‘pattern matching’ comparison

Table 1. Descriptive data from the academic survey.

Variable	Count	Percentage	Total
Gender			
Female	1730	41	4182
Male	2452	59	4182
Age			
39 and younger	487	12	4182
40–49 years old	1031	25	4182
50–59 years old	1527	37	4182
60 years and more	1137	27	4182
Position			
Assistant Professor	1651	39	4182
Associate Professor	1278	31	4182
Professor	1253	30	4182
Discipline			
Humanities	688	16	4182
Medicine and health	861	21	4182
Natural Science	1147	27	4182
Social Science	1486	36	4182
Type of institution:			
University	2426	58	4182
University College	1756	42	4182
Work experience outside academe			
No	1882	47	4006
Yes	2124	53	4006
External funding:			
No	2399	57	4182
Yes	1783	43	4182

Table 2. Descriptive data from the survey to government officials.

Variable	Count	Percentage	Total
Gender			
Female	503	51	978
Male	475	49	978
Type of organization			
Agency	310	23	1325
Ministry	1015	77	1325
Type of position			
Advisor/senior consultant	942	71	1325
Consultant	57	4	1325
Special advisor	114	9	1325
Leader	154	12	1325
Other	58	4	1325
Work task			
Case processing	252	19	1325
Economy, admin, HR and IT	284	21	1325
Analysis	247	19	1325
Policy development	392	30	1325
Other	150	11	1325
Level of education			
Less than five years	249	19	1325
Master degree	1019	77	1325
PhD	57	4	1325
Field of education			
STEM	193	15	1318
Social Science	713	54	1318
Humanities	124	9	1318
Law	168	13	1318
Other	120	9	1318
Prior Research Experience			
Yes	190	14	1325
No	1135	86	1325

(Hak & Dul, 2009), and through this reflexive exercise we aimed to comprehend the co-production space more fully between policy and research. Independent variables in regressions were gender, age, institutional type, academic discipline, non-academic work experience and external funding.

4. Results

4.1. Academics' participation in knowledge exchange with government organisations

Academic knowledge exchange, broadly defined, was very common among academics. In the survey, 51% of the respondents said that they had cooperated with public organisations and 21% with private organisations in the three years prior to the survey. More specifically, 28% had cooperated with (national level) government organisations, 32% with regional and local public organisations and 17% with public health organisations.³ These results underscore that university-public sector collaboration is common and therefore a likely route to research impact from academia.

Male academics more often reported collaboration with government organisations, as did academics employed by universities (not colleges), those in full professor positions and those above 50 years old. The importance of seniority echoes results from studies of university-industry relations (e.g. Abreu and Grinevich 2013). In addition, we found that non-academic work experience and external research funding increased the likelihood of collaboration with government organisations. Furthermore, social scientists were more likely to cooperate with public organisations (38%) compared to researchers from STEM disciplines (21%), who on the other hand more often interacted with industry and private organisations. This pattern was confirmed through the regression analysis (Table 3).

Table 3. Multiple binominal logistic regression with cooperation with governmental organisations as dependent variable. Survey to the academics.

	Dependent variable: Having cooperated with governmental organizations					
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.247*** (0.071)	-0.230*** (0.072)	-0.180** (0.073)	-0.252*** (0.076)	-0.207*** (0.078)	-0.158** (0.079)
Age 40–49		0.527*** (0.142)	0.511*** (0.142)	0.485*** (0.144)	0.426*** (0.146)	0.337** (0.148)
Age 50–59		0.812*** (0.134)	0.805*** (0.135)	0.754*** (0.137)	0.691*** (0.139)	0.616*** (0.141)
Age 60+		0.852*** (0.138)	0.833*** (0.138)	0.788*** (0.141)	0.772*** (0.143)	0.726*** (0.145)
University College			-0.308*** (0.073)	-0.399*** (0.075)	-0.386*** (0.076)	-0.190** (0.079)
Medicine				0.190 (0.125)	0.166 (0.126)	0.056 (0.129)
Natural Science				-0.059 (0.119)	-0.090 (0.120)	-0.275** (0.123)
Social Science				0.832*** (0.108)	0.798*** (0.110)	0.738*** (0.112)
Not work experience					-0.357*** (0.073)	-0.339*** (0.074)
Not got external funding						-0.950*** (0.080)
Constant	-0.847*** (0.044)	-1.529*** (0.126)	-1.413*** (0.129)	-1.658*** (0.155)	-1.398*** (0.162)	-0.975*** (0.167)
Observations	4182	4182	4182	4182	4006	4006
Log Likelihood	-2472.662	-2446.213	-2437.104	-2374.122	-2300.482	-2225.561
Akaike Inf. Crit.	4949.325	4902.426	4886.208	4766.244	4620.964	4473.123

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Moreover, we compared 'channels for knowledge exchange' used by academics who had collaborated with government organisations, with other groups of academics (Figure 1). Participation in user-oriented conferences, publishing non-academic articles and media contributions, and making presentations for users were frequent channels for knowledge exchange by all academics. Professional education and training, and advisory and consultancy work, were also common channels for knowledge exchange among academics, but less so for academics that collaborate with government organisations.

Significant differences appeared when comparing academics that collaborate with public organisations in general and government organisations in particular, with academics who collaborate with private organisations. They first group was more active in conferences, user presentations and non-

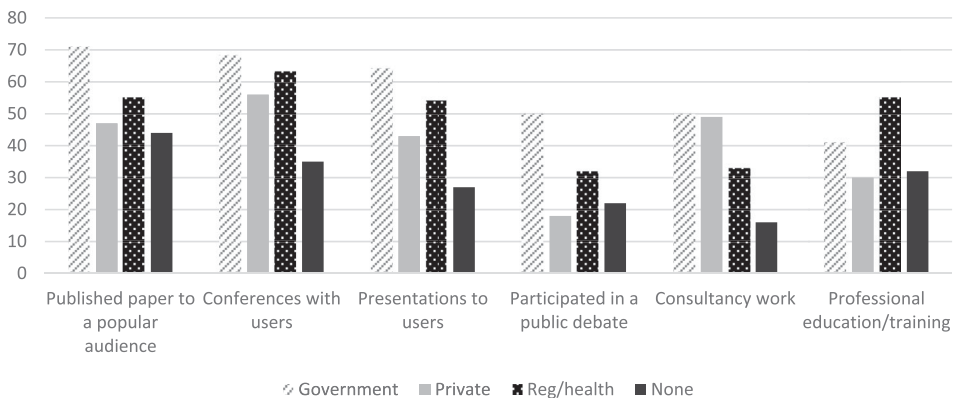


Figure 1. Comparison of knowledge exchange activities by academics with different collaboration patterns.

academic publishing activities. Academics who collaborated with municipalities and health care organisations also reported a higher degree of participation in training and education activities. In general, academics who collaborated with government organisations were more active and used a wider set of knowledge exchange channels than their peers.

4.2. Government officials' participation in knowledge exchange activities with academia

From the survey to government officials, we initially observed that 50% reported that they consulted research weekly, 33% monthly and 21% more seldom or never. Forty-two per cent of the ones who consulted research as part of their job, reported that they 'often' sourced research from universities, university colleges or research institutes ('academic sources').

Government officials holding a PhD degree were more likely to report that they frequently accessed research directly from academic sources (68%), compared to colleagues with a master's degree (44%) or a bachelor's degree (27%). Having prior work experience from research institutions increased the tendency to source academic knowledge (from 39% to 60%), as did having a job that involved 'policy analysis' (70%). Government officials who worked with administrative tasks were the least likely to source academic research. Respondents from agencies were somewhat more likely to access research from academic sources (45%) compared to ministry employees (40%).

These binary relations were confirmed in the regression analysis with sourcing academic knowledge (often and very often) as the dependent variable (Table 4). Additionally, the regression revealed that males were significantly more likely to access research from academic sources than their female colleagues, controlling for other background variables. Neither the government officials' formal positions (job title) nor their fields of education (disciplinary specialisation) appeared as significant when controlling for the respondents' work tasks. Introducing former research experience to the model probably explains why education level is not significant in the previous model. The Generalised Variance Inflation Factor was below 1.4 which indicates that there is no interference between the independent variables. Yet, the BIC-test shows that model 6 is better suited to explaining the variance in the data: adding the respondents' research experience does not improve the model.

We also asked the government officials what they regard as the most important channels or methods to access scientific knowledge. In Figure 2, we compare this between government officials who frequently report to access academic sources and their peers.

Figure 2 illustrates that government officials using academic sources more frequently than their peers engaged in all the different methods to gain access to knowledge. Written sources or wider dissemination of scientific knowledge and research news were particularly important, and more so than direct interactions.

4.3. Co-production spaces

Our results indicate that academics often participate in knowledge exchange activities with stakeholders and frequently with government agencies. Likewise, government officials regularly consult academic research as part of their job. Government officials that are most active when it comes to sourcing knowledge from academic sources, share characteristics with academics when it comes to their training (research degrees), prior work experience, and some affinity in the work that they perform (analytical work).

Many government officials in the sample are social scientists by training (including economists), and we also see that social scientists in universities are more active than their peers in other scientific fields when it comes interacting with government organisations. Moreover, academics with prior work experience from non-research settings and government officials with prior work experience in research are more active in knowledge exchange than their respective peer groups. These findings indicate that knowledge exchange practices are deeply rooted in established networks or cross-sectoral communities based on educational background and work experience.

Table 4. Multiple binominal logistic regression analysis with sourcing research from academic sources (often or very often) as the dependent variable.

	Dependent variable:						
	Sourcing research from scientific institutions						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	0.195 (0.132)	0.207 (0.133)	0.226* (0.135)	0.213 (0.137)	0.295** (0.146)	0.320** (0.147)	0.314** (0.147)
Education level							
Less than 5 years of education		-0.642*** (0.208)	-0.698*** (0.221)	-0.688*** (0.222)	-0.387 (0.237)	-0.425* (0.239)	-0.376 (0.240)
PhD		0.943*** (0.322)	0.918*** (0.327)	0.889*** (0.329)	0.703** (0.345)	0.731** (0.347)	0.469 (0.369)
Field of education							
Social Science			0.462** (0.213)	0.496** (0.215)	0.325 (0.231)	0.332 (0.232)	0.359 (0.232)
Humanities			0.317 (0.286)	0.372 (0.288)	0.329 (0.305)	0.309 (0.306)	0.305 (0.307)
Law			-0.412 (0.287)	-0.418 (0.291)	-0.305 (0.310)	-0.271 (0.311)	-0.199 (0.314)
Other			0.480 (0.328)	0.508 (0.330)	0.290 (0.349)	0.285 (0.350)	0.323 (0.350)
Position							
Consultant				-0.076 (0.392)	0.263 (0.417)	0.346 (0.421)	0.358 (0.420)
Special advisor				0.539** (0.238)	0.290 (0.250)	0.348 (0.252)	0.321 (0.254)
Leader				-0.112 (0.207)	-0.077 (0.220)	-0.038 (0.222)	-0.037 (0.223)
Other				0.427 (0.379)	0.301 (0.403)	0.277 (0.402)	0.278 (0.404)
Work tasks							
Administrative					-0.365 (0.276)	-0.347 (0.276)	-0.341 (0.277)
Analysis					1.824*** (0.248)	1.797*** (0.248)	1.764*** (0.249)
Policy development and implementation					0.991*** (0.221)	1.024*** (0.222)	1.022*** (0.222)
Other					1.132*** (0.278)	1.123*** (0.279)	1.102*** (0.279)
Ministry						-0.330* (0.177)	-0.349** (0.177)
No research experience							-0.406** (0.203)
Constant	-0.309*** (0.093)	-0.280*** (0.098)	-0.571*** (0.217)	-0.640*** (0.221)	-1.398*** (0.288)	-1.182*** (0.309)	-0.845** (0.350)
Observations	937	937	937	937	937	937	937
Log Likelihood	-643.136	-632.562	-622.975	-619.389	-565.670	-563.922	-561.910
Akaike Inf. Crit.	1290.272	1273.124	1261.951	1262.778	1163.341	1161.844	1159.820

Note: Reference: Gender (Female), Education (Master), Field (STEM), Position (Advisor), Task (Case processing), Type of organization (Agency), Research experience (have).

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

There are also interesting overlaps and contrasts when it comes to chosen methods for exchanging and accessing scientific knowledge. As seen in [Figure 1](#), academics exchanged knowledge with stakeholders by participating in events, by publishing in popular media and by holding presentations and other direct forms of communication with users. Government officials ([Figure 2](#)) viewed general scientific communication, including contributions in traditional and social media, blogs and newsletters as important, but also the scientific literature itself. Furthermore, direct contact with researchers (in seminars, conferences and invited talks) were less frequently used channels to engage with scientific knowledge for government officials. Far more academics said that they

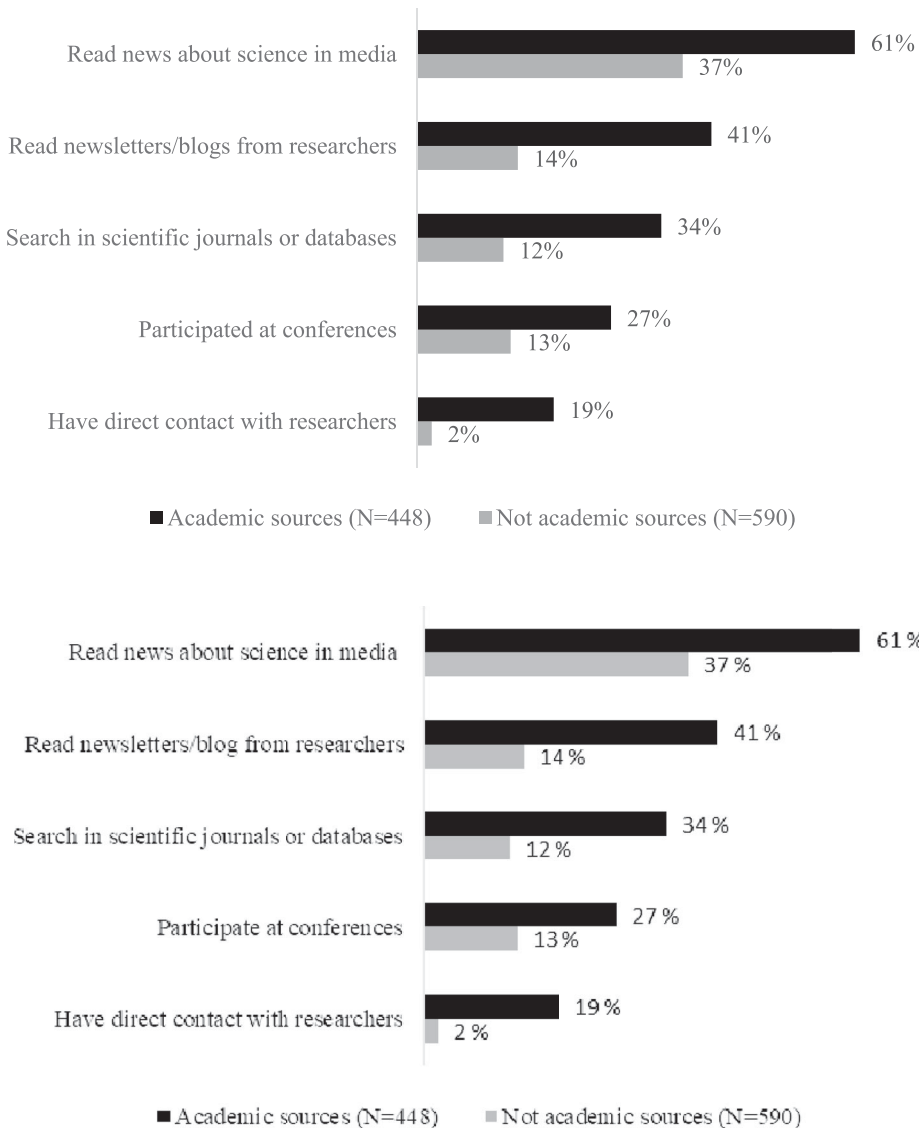


Figure 2. Methods to obtain scientific knowledge. Government officials that frequently access research from academic sources compared to their peers (percent of total).

contribute to events with users and present their work to users, than government officials say that they get access to scientific knowledge in this way (Figure 3).⁴

These findings indicate that the co-production space is characterised by similarities between users that frequently source academic knowledge, which is also seen in their preferred channels to access knowledge as compared to their peers without frequent contact with academics. Academics who frequently collaborate with government organisations also have more varied forms of communication, more frequent media communication and participation in public debates.

5. Discussion

In this paper, we asked how academics and government officials engaged in mutual knowledge exchange differ from their peers, and what we can learn from looking at such exchange from

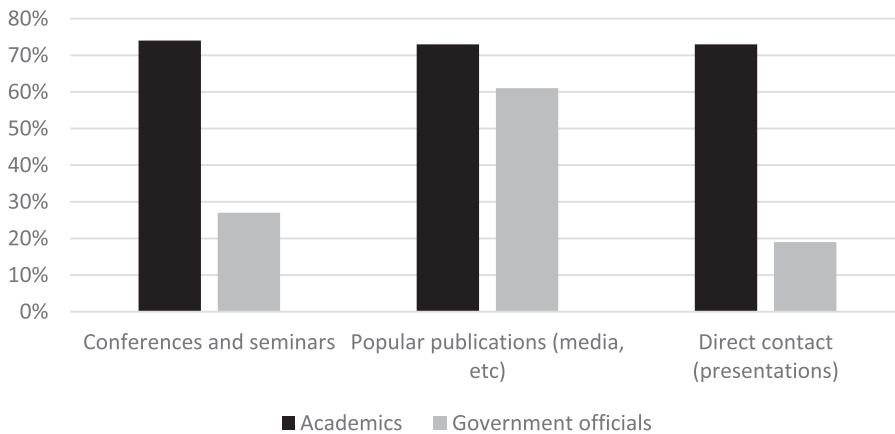


Figure 3. Academics' participation in knowledge exchange activities (selected) and government officials use of different methods to access knowledge (percent).

both sides. A main result is that these individuals are more engaged in various knowledge exchange activities than their colleagues (academics with other forms of interaction, government officials with lower use of research). The two groups of active knowledge exchangers have some similarities, most importantly in our data is that they often have work experience from the other sector and that many of them are social scientists. They do seem to prefer or highlight somewhat different forms of exchange, however, where the academics put more emphasis on direct science communication than government officials.

The results capture several issues relevant for understanding knowledge exchange. The empirical contributions are mainly about the importance of looking both at researchers' and stakeholders' perspectives and participation in knowledge exchange. Our study supports the broadening of attention in the literature on varied forms of knowledge exchange practices in different disciplines and with different stakeholders (Abreu and Grinevich 2013; Olmos-Peñuela, Castro-Martínez, and D'Este 2014; Benneworth et al. 2016; Perkmann et al. 2021). We underline the value of addressing policy organisations as they represent important partners for academics, and for this reasons, further attention to the context of academic-public sector interactions as a space for knowledge exchange is warranted.

Our results also highlight the importance of indirect forms of contact, and particularly the value of different forms of external communication and diffusion from a user perspective. This finding is largely in line with public administration research on how government officials (and policymakers) access and use scientific knowledge (Head et al. 2014; Cherney et al. 2015). This finding does not entail that direct forms of contact are unimportant, and we find that knowledge exchange involves multiple forms of contact. Academic participation in public debates and research communication activities (including regular scientific publishing) may involve attention to new issues and agenda-setting processes, leading to direct forms of contact where deeper forms of knowledge exchange are the goal.

Using a co-production perspective brings attention to the ones that most actively participate in what we have termed the *co-production spaces*. We have used this term because we want to bring attention to informal networks and communities that straddle organisational boundaries that form a particular site or space. This space between the sectors appears to be inhabited by a smaller set of individuals that circulate and participate in many forms of exchange. If we compare these individuals across sectors, we interestingly find that they share some characteristics, such as educational background, past work experiences, current work tasks and a preference for certain forms of contact. The co-production concept stresses 'synergistic interactions' (Lemos et al. 2018) because scientific

knowledge is not easily 'transferred' to policy contexts but needs to be actively circulated, activated, and translated by experts in the policy domains to become relevant and have an impact (Jasanoff 2004). Furthermore, the co-production literature (and some of the knowledge exchange literature), uses the term for macro-level analyses: science and society engage in co-production of legitimate knowledge for stability or solving central challenges. Our data indicate that this process has certain layers or a core of key people with a much more intensive interaction than their colleagues.

In other words, co-production spaces with limited numbers of highly skilled experts appear to have an important role. This finding also speaks to the co-production literature as it enables us to see the individuals and the activities that are involved, as called for by Bremer and Meisch (2017). One interesting finding when comparing the two groups, and that underscores the co-production concept, is that there are several similarities between the two groups, and these features make the distinction between 'users' and 'producers' of knowledge a tenuous one.

This finding is also relevant for the academic engagement literature that often has concluded that academics should be stimulated to participate more actively in industry collaboration. Our result indicates that public sector collaboration is important and pervasive, but that it may not be adequately captured by attention to formal partnerships and projects. Academic engagement in the form of co-production is to some extent a closed or restricted space as it requires *embeddedness in specific expert networks*.

6. Conclusions

The answer to our main research question (the who and the how) is that there is a small – and perhaps therefore exclusive – group that engages intensely and in multiple ways in cross-sector interaction between academia and government organisations. We see this as an indication of co-production, not in a generic sense of co-production between science and policy, but as a space inhabited by individuals that share certain similarities.

The empirical studies reported here have multiple limitations, and we encourage further research on the science-policy interface to gain a more comprehensive understanding of academic knowledge exchange. It would be particularly useful to extend these forms of analysis to other countries, as the institutional conditions in the co-production space are likely to differ. Moreover, cross-sectional surveys with limited questions and predefined response items do not capture the richness of knowledge exchange practices, the contextual conditions that shape them, or their development over time. Although a qualitative comparison of patterns from two separate surveys has given useful insights and contributions, an empirical mirroring approach allowing for statistical comparison would also be valuable. Finally, based on our study, we recommend the use of more detailed qualitative studies, for instance of specific policy domains to capture embedded practices and how different interactions evolve over time.

In terms of implications, higher education policies and university management approaches may not be very effective in stimulating more or wider interaction between academics and stakeholders, if that is indeed an important policy goal. What may be important is to support wider participation in research communication, as this may also be an entry into knowledge exchange and impact. University management may strengthen efforts to support research communication to stimulate knowledge exchange and collaboration practices – and to do this in a way that includes the experiences and competences of the most active individuals in wider academic networks.

The latter is also important for how we see and measure research impact, where attention has been put on tracing direct impacts from research results to demonstrated application. Our results support the more general message in recent literature that research impacts are rarely direct and rather depend upon participation, circulation, and translation, or in other words – co-production.

Notes

1. In all logistic regression models, we conducted ANOVA tests to investigate whether each independent variable contributed significantly to the dependent variable. Moreover, we applied Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC) tests to determine the models which were most suited to explain the variance in the independent variable (Agresti 2013). We also checked for multicollinearity with the use of a Variance Inflation Factor (VIF)-test (Lin 2008).
2. The dependent variable consisted of two questions 'How often do you search for research from Universities and University Colleges' and 'How often do you search from research from Research Institutes' with alternatives 'Very often', 'Often', 'Sometimes', 'Seldom', 'Very seldom', and 'Never'. Sourcing data from research institutions consisted of those who had answered 'Very often' or 'Often' on one of the two questions.
3. In total, 717 respondents (17%) answered that they cooperated with two or three of these groups of stakeholders.
4. The figure compares responses on response items about channels for knowledge exchange that were relatively similar in the two surveys. It is important to note that the questions were not identical, and the figure is meant to illustrate group similarities and differences. It may also be seen as an indication that some forms of contact are more distinct from 'normal work' for some groups.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Work on this paper was supported by grant 256240 (OSIRIS) from the Research Council of Norway. The academic survey was funded by a programme at NIFU from the Ministry of Education and Research in Norway.

ORCID

Magnus Gulbrandsen  <http://orcid.org/0000-0001-9976-1608>
 Erlend Simensen  <http://orcid.org/0000-0002-9243-7685>

References

- Abreu, M., and V. Grinevich. 2013. "The Nature of Academic Entrepreneurship in the UK: Widening the Focus on Entrepreneurial Activities." *Research Policy* 42 (2): 408–22. doi:10.1016/j.respol.2012.10.005
- Agresti, A. 2013. *Categorical Data Analysis*. Hoboken, New Jersey: John Wiley & Sons.
- Amara, N., M. Ouimet, and R. Landry. 2004. "New Evidence on Instrumental, Conceptual, and Symbolic Utilization of University Research in Government Agencies." *Science Communication* 26 (1): 75–106. doi:10.1177/1075547004267491
- Ankrah, S. N., T. F. Burgess, P. Grimshaw, and N. E. Shaw. 2013. "Asking Both University and Industry Actors About Their Engagement in Knowledge Transfer: What Single-Group Studies of Motives Omit." *Technovation* 33 (2-3): 50–65. doi:10.1016/j.technovation.2012.11.001
- Bandola-Gill, Justyna, Megan Arthur, and Rhodri Ivor Leng. 2022. "What is Co-Production? Conceptualising and Understanding Co-Production of Knowledge and Policy Across Different Theoretical Perspectives." *Evidence & Policy* XX: 1–24. doi:10.1332/174426421X16420955772641
- Bédard, P. O. 2015. "The Mobilization of Scientific Evidence by Public Policy Analysts: Path Analysis and Predicted Probabilities." *SAGE Open* 5(3). doi:10.1177/2158244015604193
- Bednarek, A. T., C. Wyborn, C. Cvitanovic, R. Meyer, R. M. Colvin, P. F. Addison, S. L. Close, et al. 2018. "Boundary Spanning at the Science–Policy Interface: The Practitioners' Perspectives." *Sustainability Science* 13 (4): 1175–83. doi:10.1007/s11625-018-0550-9.
- Bekkers, R., and I. M. B. Freitas. 2008. "Analysing Knowledge Transfer Channels Between Universities and Industry: To What Degree Do Sectors Also Matter?" *Research Policy* 37 (10): 1837–53. doi:10.1016/j.respol.2008.07.007
- Bremer, Scott, and Simon Meisch. 2017. "Co-production in Climate Change Research: Reviewing Different Perspectives." *WIREs Climate Change* 8: e482. doi:10.1002/wcc.482.
- Brown, K., and R. Keast. 2003. "Citizen-Government Engagement: Community Connection Through Networked Arrangements." *Asian Journal of Public Administration* 25 (1): 107–31. doi:10.1080/02598272.2003.10800411.

- Cherney, A., B. Head, J. Povey, M. Ferguson, and P. Boreham. 2015. "Use of Academic Social Research by Public Officials: Exploring Preferences and Constraints That Impact on Research use." *Evidence & Policy* 11(2): 169–88. doi:10.1332/174426514X14138926450067
- Christensen, J., and C. Holst. 2017. "Advisory Commissions, Academic Expertise and Democratic Legitimacy: The Case of Norway." *Science and Public Policy* 44 (6): 821–33. doi:10.1093/scipol/scx016
- Contandriopoulos, D., M. Lemire, J. L. Denis, and É Tremblay. 2010. "Knowledge Exchange Processes in Organizations and Policy Arenas: A Narrative Systematic Review of the Literature." *Milbank Quarterly* 88 (4): 444–83. doi:10.1111/j.1468-0009.2010.00608.x
- Crona, B. I., and J. N. Parker. 2011. "Network Determinants of Knowledge Utilization: Preliminary Lessons from a Boundary Organization." *Science Communication* 33 (4): 448–71. doi:10.1177/1075547011408116
- Greenhalgh, T., J. Howick, and N. Maskrey. 2014. "Evidence Based Medicine: A Movement in Crisis?" *BMJ* 348: 1–7. doi:10.1136/bmj.g3725
- Hak, T., and Dul J. 2009. Pattern Matching.
- Head, B. W. 2016. "Toward More "Evidence-Informed" Policy Making?" *Public Administration Review* 76: 472–84. doi:10.1111/puar.12475
- Head, B., M. Ferguson, A. Cherney, and P. Boreham. 2014. "Are Policy-Makers Interested in Social Research? Exploring the Sources and Uses of Valued Information among Public Servants in Australia." *Policy and Society* 33 (2): 89–101. doi:10.1016/j.polsoc.2014.04.004
- Jasanoff, S. 2004. *States of Knowledge*. Abingdon: Taylor & Francis.
- Keast, R., and M. Mandell. 2014. "The Collaborative Push: Moving Beyond Rhetoric and Gaining Evidence." *Journal of Management & Governance* 18: 9–28. doi:10.1007/s10997-012-9234-5.
- Lemos, M. C., J. C. Arnott, N. M. Ardoin, K. Baja, A. T. Bednarek, A. Dewulf, Clare Fieseler, et al. 2018. "To Co-Produce or Not to Co-Produce." *Nature Sustainability* 1 (12): 722–4. doi:10.1038/s41893-018-0191-0.
- Lin, F. 2008. "Solving Multicollinearity in the Process of Fitting Regression Model Using the Nested Estimate Procedure." *Quality & Quantity* 42: 417–26. doi:10.1007/s11135-006-9055-1
- Nelson, R., and Rosenberg N. 1994. "American Universities and Technical Advance in Industry." *Research Policy* 23 (3): 323–348. doi:10.1016/0048-7333(94)90042-6
- Olmos-Peñuela, J., E. Castro-Martínez, and P. D'Este. 2014. "Knowledge Transfer Activities in Social Sciences and Humanities: Explaining the Interactions of Research Groups with non-Academic Agents." *Research Policy* 43 (4): 696–706. doi:10.1016/j.respol.2013.12.004
- Ostrom, E. 1996. "Crossing the Great Divide: Coproduction, Synergy, and Development." *World Development* 24 (6): 1073–87. doi:10.1016/0305-750X(96)00023-X
- Ouimet, M., R. Landry, S. Ziam, and P. O. Bédard. 2009. "The Absorption of Research Knowledge by Public Civil Servants." *Evidence & Policy* 5 (4): 331–50. doi:10.1332/174426409X478734
- Perkmann, M., R. Salandra, V. Tartari, M. McKelvey, and A. Hughes. 2021. "Academic Engagement: A Review of the Literature 2011–2019." *Research Policy* 50 (1): 104114. doi:10.1016/j.respol.2020.104114
- Perkmann, M., V. Tartari, et al. 2013. "Academic Engagement and Commercialisation: A Review of the Literature on University–Industry Relations." *Research Policy* 42 (2): 423–42. doi:10.1016/j.respol.2012.09.007
- Squires, J. E., C. A. Estabrooks, P. Gustavsson, and L. Wallin. 2011. "Individual Determinants of Research Utilization by Nurses: A Systematic Review Update." *Implementation Science* 6 (1): 1–20. doi:10.1186/1748-5908-6-1
- Tellmann, Silje Maria, and Magnus Gulbrandsen. 2022. "The Other Side of the Boundary: Productive Interactions Seen from the Policy Side." *Science and Public Policy* 49 (4): 621–31. doi:10.1093/scipol/scac013.
- Thune, T., I. Reymert, M. Gulbrandsen, and P. Olaf Aamodt. 2016. "Universities and External Engagement Activities: Particular Profiles for Particular Universities?" *Science and Public Policy* 43 (6): 774–86. doi:10.1093/scipol/scw019.