Eu-Spri Forum Early Career Researcher Conference

EXPLAINING RESEARCHERS' WILLINGNESS FOR NON-ACADEMICS TO INFLUENCE THEIR RESEARCH AGENDAS

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2014 INGENIO PhD Days, Valencia| 7 April 2014

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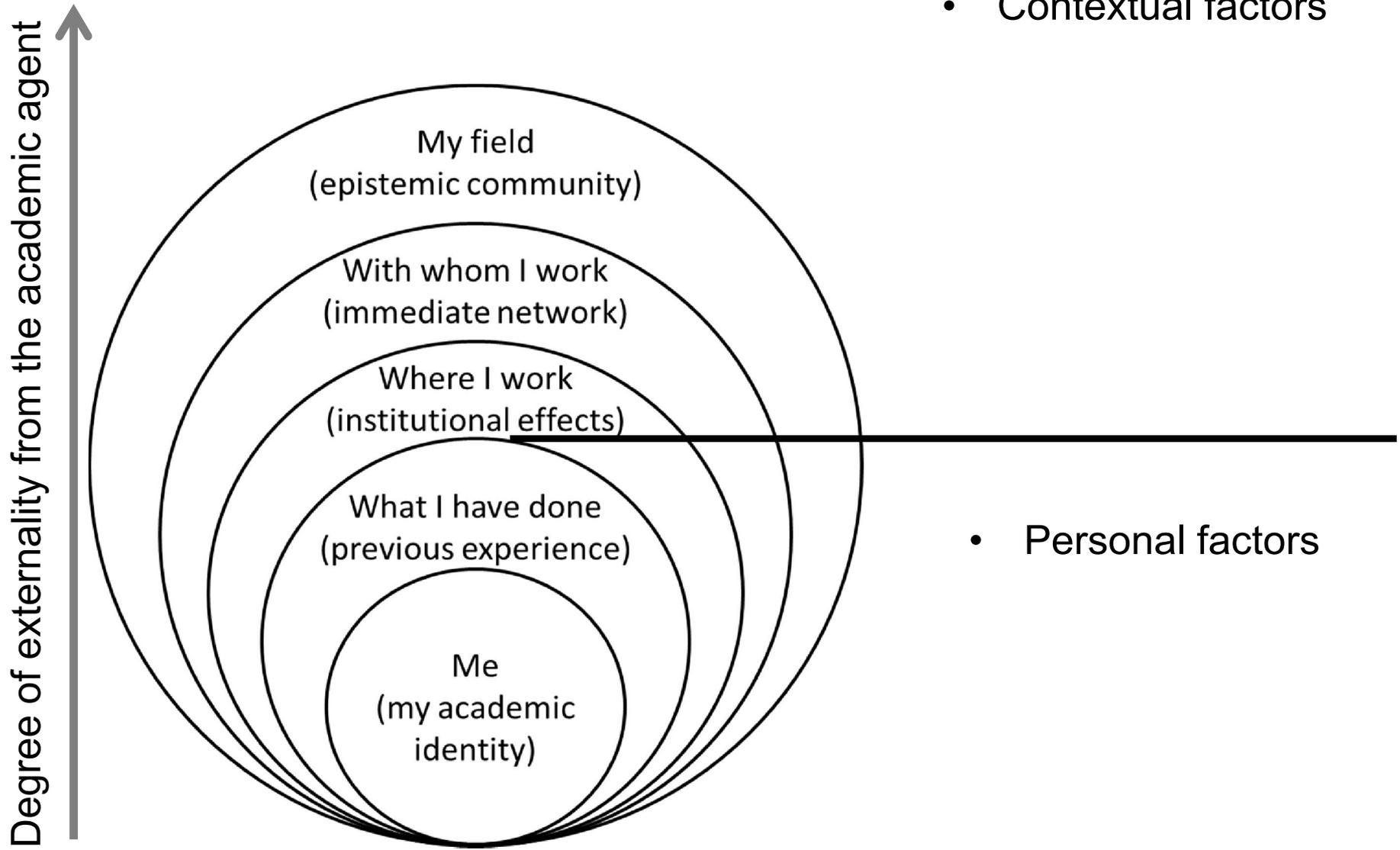y del conocimiento

- ✓ The aim of the paper is to contribute to the discussion about why academic engage with external agents.

- ✓ *Our diagnosis*:

  - Studies on researchers' motivation to engage with society biased to benefit-focused approaches

  - Reasons underlying researcher's societal engagement are driven by more complex set of factors beyond immediate benefits.

- ✓ *Our perspective:*

  - We focus on the core element of the research : the research question setting process

- ✓ *Our contribution:*

  - *We propose the concept of co-creationarity as a characteristic indicating researchers' willingness to let outside agents influence research agendas and then to conduct 'useful' research.*

  - *We explore the personal and contextual factors affecting researchers' co-creationarity*

THE CONCEPT: CO-CREATIONARITY

✓ **Co-creationarity:** openness of researchers' to allow external parties to influence their research agendas (opening the way to more useful knowledge)

- *Attitudinal dimension (D1)*: an attitude to conduct research inspired by potential use (e.g. Pasteur and Edison utility attitudes (Stokes, 1997)

- *Behavioural dimension (D2)*: : research project routines involving a pro-social behaviour (D'Este et al., 2013)

- *Dependency dimension (D3)*: : making the research activity dependent on unique knowledge held by societal partners (D'Este and Perkman, 2011; Lam, 2011)

- *Experiential dimension (D4)*: having experiences changes in the research agenda due to external influences (Lee, 1996; Verspagen, 2006)

FACTORS SHAPING CO-CREATIONARITY

Degree of externality from the academic agent

My field
(epistemic community)

With whom I work
(immediate network)

Where I work
(institutional effects)

What I have done
(previous experience)

Me
(my academic
identity)

- Contextual factors

- Personal factors

- **I1. Academic identity**

  H1: Co-creationarity is positively related with entrepreneurial ideal type identities

- **I2. Previous experience**

  H2: Co-creationarity is positively related with a positive evaluation of the past collaborative experiences

- **I3. Local environment**

  H3: Co-creationarity is positively related with a positive perception about the institutional support for engaging with non-academics
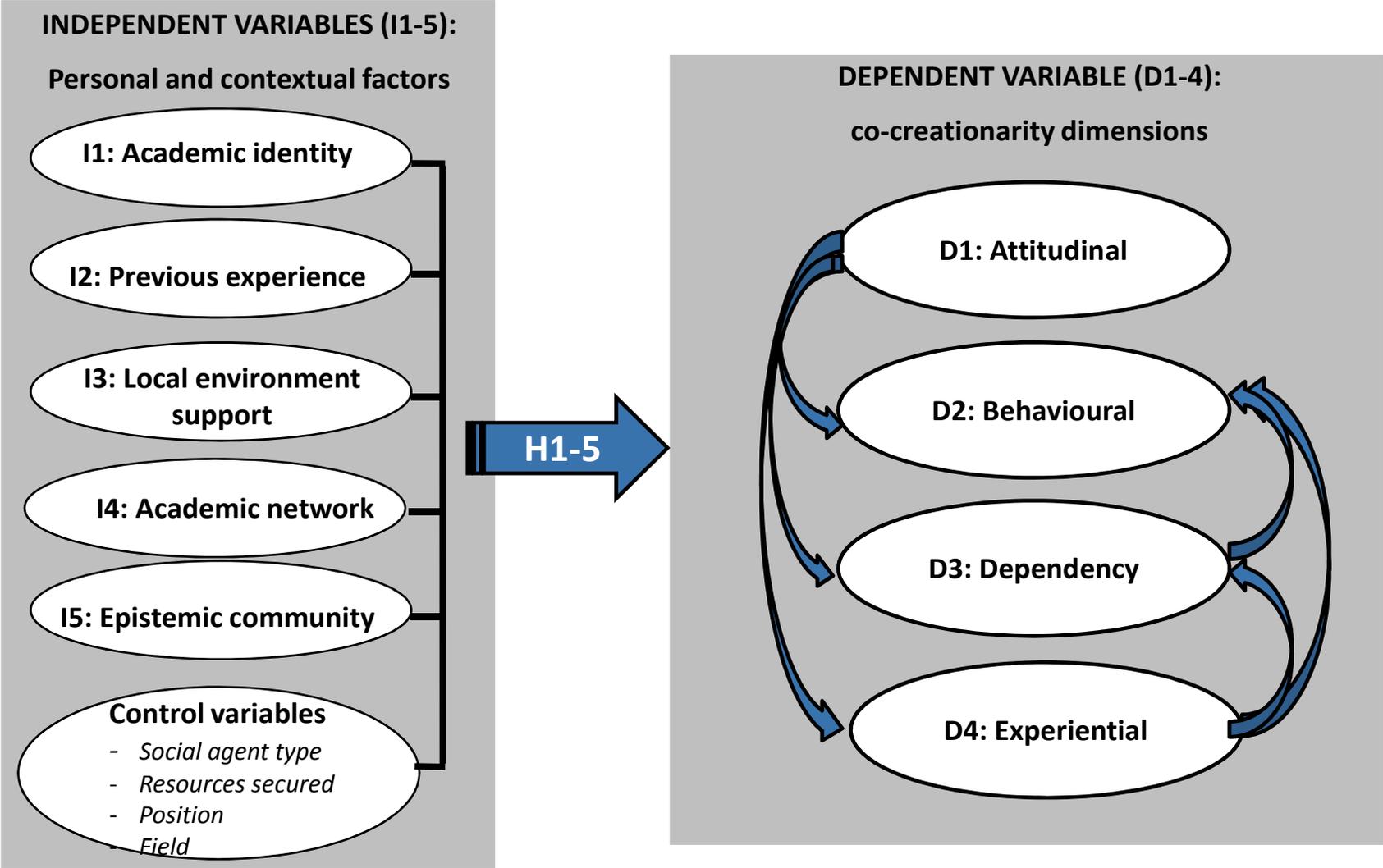
- **I4. Academic network**

  H4: Co-creationarity is positively related with establishing connections with external academics and academic from other disciplines.

- **I5. Epistemic community**

  H5: Co-creationarity is positively related those academic communities in this external agents are seen as legitimate contributors for the creation of valid knowledge

INDEPENDENT VARIABLES (I1-5):

Personal and contextual factors

- I1: Academic identity
- I2: Previous experience
- I3: Local environment support
- I4: Academic network
- I5: Epistemic community

Control variables
- Social agent type
- Resources secured
- Position
- Field

H1-5

DEPENDENT VARIABLE (D1-4):

co-creationarity dimensions

- D1: Attitudinal
- D2: Behavioural
- D3: Dependency
- D4: Experiential

DATA COLLECTION

Population: 4,240 researchers from the Spanish National Research Council (CSIC)

Source: online questionnaire (IMPACTO project)

Period: 7th April- 14th May 2011

Unit of analysis: the researcher

Sampling: proportional stratification by areas (8) and researchers category (4)

Sample: 1,583 researchers (37% response rate)

METHODOLOGY

Multivariate Path Analysis:

a) To explore how the co-creationarity dimensions correlates (dependent variables)

b) To identify the salient factors (independent variables) shaping these dimensions

ECONOMETRIC RESULTS

Dependent variables (CC dimensions)	Attitudinal	Behavioural	Dependency	Experiential
Independent variables				
Academic identity				
• Entrepreneurial ideal	+***	+***	+***	+***
Previous Experience				
• Knowledge accessed	+***	+***	+***	+***
Local environment -				
• Institute moral support				
• Institute administrative support				
Academic network				
• Personal network				
• Multidisciplinary network	+***	+***		+*
Epistemic community				
• Lack of scientific merit	+*			
Control variables				
• Firm		+***		
• Government Agency				
• NPO				
• Resources secured			+***	
• Academic position [a]	included	included	included	included
• Fields[b]	included	included	included	included
Covariance between disturbances	ε_1	ε_2	ε_3	
ε_2	+***			
ε_3	+***	+***		
ε_4	+***	+***	+***	

✓ The four co-creationarity dimensions are positively correlated which suggests they go "hand in hand" as component of an underlying co-creationarity charactersitic

✓ The most salient factors that explain co-creationarity are related to personal characteristics (i.e. *academic identity* and *past experiences*)

✓ Overally, factors related to the *context* in which the researcher is embedded are not significant to explain researchers' engagement in co-creationarity.

   ▪ An exception is the *multidisciplinary network*, suggesting that working with academics from other disciplines is positively related with attitudinal and behavioural co-creationarity dimensions

CONCLUSIONS

- ✓ The co-creationarity concept can provides a comprehensive view to deal with researchers' motivation for societal engagement and the factors shaping it by focusing on a single idea: research agenda setting.

- ✓ External imposing instrumentalist norms and rational regarding engagement practices does not seem to be salient factors to shape co-creationarity

- ✓ Policy-makers should not fall in changeing the incentive structure (i.e. short run measures) to promote engagement since it is not enough to change behaviour

- ✓ More long term processes linked with PhD formation (to shape academic identity) and opportunities to engagement (to generate past experiences) are needed for researchers engagement in co-creation.

Thank you for your attention

Suggestions and comments are welcome!

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POPULATION AND SAMPLE DISTRIBUTION BY FIELDS

	Population (N)	Population (%)	Sample (N)	Sample (%)	% Differences χ^2 test (*)
Biology and Biomedicine	771	18.2%	244	15.4%	-2.8%
Food Science and Technology	285	6.7%	128	8.1%	1.4%
Materials Science and Technology	562	13.3%	201	12.7%	-0.6%
Physical Science and Technology	569	13.4%	204	12.9%	-0.5%
Chemical Science and Technology	480	11.3%	209	13.2%	1.9%
Agricultural Sciences	412	9.7%	203	12.8%	3.1%*
Natural Resources	759	17.9%	277	17.5%	-0.4%
Social Sciences and Humanities	402	9.5%	117	7.4%	-2.1%
TOTAL	**4,240**	**100**	**1,583**	**100**	

Note: χ^2 test has been used to assess whether there are differences between the population and the sample distribution for each area of knowledge.

* indicates statistical differences at 5%. Agricultural sciences are statistically overrepresented in the sample.

DEPENDENT VARIABLES

Dependent variables (continuous)	Measure	Sub-items	Method and descriptive statistics
Behavioural dimension	Measured as an index on a Likert scale of frequency ranging from 1 (never) to 4 (regularly) regarding frequency with which the researcher engages in each of the following activities when conducting a research project. The scores of the respondents, which initially ranged from 3 to 12, were weighted in order to take into account "does not apply" answers. Thus, for each respondent, the sum of the score was divided by the number of applicable item(s). Even though the initial index has integer values from 1 to 4, once weighted, it can take on non-integer values.	• Identify the potential results of your research that can benefit users[1] • Identify the potential users who can apply the results of your research • Identify intermediaries in order to transfer the results of your results	Sum of the three items divided by the number of applicable items **Range: 1-4** **Mean: 2.52** **S.D: 0.73** **Cronbach's α:0.789**
Dependency dimension	Measured as an index on a Likert scale of frequency ranging from 1 (not important) to 4(very important) regarding the degree of importance the researcher attaches to each of the following items, as personal motivations to establish interactions with non-academic entities (firms, public administration agencies, non-profit organisations). The scores of the respondents, which initially ranged from 4 to 16, were weighted in order to take into account "does not apply" answers. Thus, for each respondent, the sum of the score was divided by the number of applicable item(s). Even though the initial index has integer values from 1 to 4, once weighted, it can take on non-integer values.	• To keep abreast of about the areas of interest of these non-academic entities • To test the feasibility and practical application of your research • To obtain information or materials necessary for the development of your current lines of research • To explore new lines of research	Sum of the four items divided by the number of applicable items **Range: 1-4** **Mean: 3.11** **S.D: 0.55** **Cronbach's α:0.713**

Dependent variables (categorical)	Description	Descriptives % of '1'
Attitudinal dimension	Dichotomous variable: - coded '1' if the researcher scientific activity was inspired *some* or *a lot* by the practical use and/or application of knowledge outside the academic environment, and 0 otherwise.	**71.4%**
Experiential dimension	Dichotomous variable: - coded '1' if the researcher has experienced *some* or *substantial* changes in the research agenda as a result of the relationships with non-academic entities, and 0 otherwise.	**27.8%**

INDEPENDENT VARIABLES (I)

Independent variables (categorical)	Description	Descriptives % of '1'
Entrepreneurial ideal	Dichotomous variable: - coded '1' if the researcher, thinking on his/her job, attaches a *importance* or *significant importance* to contributing to the resolution of socioeconomic problems, and '0' otherwise.	**64%**
Knowledge accessed (previous experience)	Dichotomous variable: - coded '1' if the researcher, as a direct consequence of working with non-academic entities, has obtained *some* or *very important* information or material for the development of the research lines, and '0' otherwise.	**58.5%**
Institute moral support	Dichotomous variable: - coded '1' if the researcher reports that the support provided by the research institute to initiate collaborative activities *positively* affects the current relationships with other non-academic entities, and '0' otherwise.	**28.7%**
Institute administrative support	Dichotomous variable: coded '1' if the researcher reports that he administrative and managerial capacity of the research institute to conduct collaborative activities *positively* affects the current relationships with non-academic entities, and '0' otherwise.	**25.6%**
Multidisciplinarity network	Dichotomous variable: - coded '1' if the researcher reports to *usually* conducting research with researchers from other scientific disciplines, and '0' otherwise.	**28.8%**
Lack of scientific merit (epistemic community)	Dichotomous variable: - coded '1' if the researcher reports that the lack of scientific merit is a *major obstacle* or an *obstacle* in the establishment of relationships with non-academic entities, and '0' otherwise.	**29.7%**

Indepdendent variables (continuous)	Measure	Sub-items	Method and descriptive statistics
Personal (academic) network	Researchers were asked to indicate the two most frequent type of people with whom they usually conduct their research activities. The type of people is an ordinal variable ranked according to researchers' distance from other academics, and ranges as follows: 1. Alone or with people from firms and non-academic entities 2. With people from your own research group. 3. With people from your own research institute. 4. With people from other CSIC research institute 5. With people from universities and research centres in Spain 6. With people from universities and research centres in other countries Personal (academic) network is measured as the index capturing researchers' distance from the type of people with whom they usually conduct their research activities. The scores of the respondent are computed as the average of the two most frequent options and were weighted in order to take into account "does not apply" answers. Thus, for each respondent, the sum of the score was divided by the number of applicable item(s). Then, the final scores can take non-integer value from 1 to 6, where1 indicates that researchers do not usually work with other academics, and 6 indicates the highest researchers' distance from the academics with whom they usually work.	Sum of the two most frequent options divided by the number of applicable items. **Range: 1-6** **Mean: 3.42** **S.D: 0.84** **Cronbach's α: N.A**

CONTROL VARIABLES (I)

Control variables (categorical)	Description	Descriptives % of '1'
Position	The level of academic position was measured as follows: **post-doc** [**POST**]researcher is a binary variable coded '1' if the researcher is a post-doctoral contracted scientist, and '0' otherwise; **tenured scientist [TEN]** is a binary variable coded '1' if the researcher is a tenured scientist, and '0' otherwise; **scientific researcher [SCIEN]** is a binary variable coded '1' if the researcher is a scientific researcher, and '0' otherwise; finally, **professor researcher [PROF]** is a binary variable coded '1' if the researcher is a professor researcher, and '0' otherwise. This first category was used as the reference category in the econometric models. These mutually exclusive categories are based on the CSIC categorisation of research staff.	**POST:** 18.1% **TEN:** 36.4% **SCIEN:** 27.2% **PROF:** 18.3%
Firm	Dichotomous variable: - coded '1' if the researcher has collaborated at least once over the last three years with firms located in Spain, and '0' otherwise.	**76.2%**
Government agencies	Dichotomous variable: - coded '1' if the researcher has collaborated at least once over the last three years with government agencies, and '0' otherwise.	**78.3%**
Non-profit organizations	Dichotomous variable: - coded '1' if the researcher has collaborated at least once over the last three years with non-profit organisations, and '0' otherwise.	**48.6%**
Research fields	Research fields were measured with a series of dichotomous variables defined as follows: **Biology and biomedicine [BIO]** is a binary variable coded '1' if the respondent is a researcher in biology and medicine, and '0' otherwise; **Food science and technology [FOOD]** is a binary variable coded '1' if the respondent is a researcher in food science and technology, and '0' otherwise; **Materials science and technology [MAT]**, is a binary variable coded '1' if the respondent is a researcher in materials science and technology, and '0' otherwise; **Physical science and technology [PHY]** is a binary variable coded '1' if the respondent is a researcher in physical science and technology, and '0' otherwise; **Chemical science and technology [CHE]**is a binary variable coded '1' if the respondent is a researcher in chemical science and technology, and '0' otherwise; **Agricultural sciences [AGR]** is a binary variable coded '1' if the respondent is a researcher in agricultural sciences, and '0' otherwise; **Natural resources [NAT]** is a binary variable coded '1' if the respondent is a researcher in natural resources, and '0' otherwise; and finally **Social science and humanities [SSH]** is a binary variable coded '1' if the respondent is a researcher in social science and humanities, and '0' otherwise. This last category of researchers was used as the reference category in the econometric models. These mutually exclusive categories are based on the CSIC scientific areas organisation.	**BIO:** 15.4% **FOOD:** 8.1% **MAT:** 12.7% **PHY:** 12.9% **CHE:** 13.2% **AGR:** 12.8% **NAT:** 17.5% **SSH:** 7.4%

CONTROL VARIABLES (II)

Control variables (continuous)	Measure	Sub-items	Method and descriptive statistics
Resources secured	Measured as an index on a Likert scale of frequency ranging from 1 (not important) to 4(very important) regarding the degree of importance the researcher attaches to each of the following items, as personal motivations to establish interactions with non-academic entities (firms, public administration agencies, non-profit organisations). The scores of the respondents, which initially ranged from 6 to 24, were weighted in order to take into account "does not apply" answers. Thus, for each respondent, the sum of the score was divided by the number of applicable item(s). Even though the initial index has integer values from 1 to 4, once weighted, it can take on non-integer values	• To obtain additional funds for your research • To be part of a professional network or expand your professional network • To have access to the experience of non-academic professionals • To have access to equipment and infrastructure necessary for your lines of research • To increase your personal income • To obtain grants and job opportunities for your students	Sum of the six items divided by the number of applicable items **Range: 1-4** **Mean: 2.86** **S.D: 0.52** **Cronbach's α: 0.692**

COMPARISON OF MEANS OF CO-CREATIONARITY DIMENSIONS ACROSS FIELDS

(POST HOC - MULTIPLE COMPARISONS TEST)†

(5a) Revealed behaviour dimension †		Subset for α = 0.05				(5b) Dependency dimension †		Subset for α = 0.05		
Research fields	N	1	2	3	4	Research fields	N	1	2	3
• Biology and biomedicine	241	2.22				• Biology and biomedicine	243	3.00		
• Natural resources	268		2.47			• Natural resources	276	3.06	3.06	
• Materials science and technology	199		2.48			• Social science and humanities	116	3.06	3.06	
• Chemical science and technology	207		2.57	2.57		• Physical science and technology	203	3.08	3.08	
• Physical science and technology	200		2.63	2.63		• Materials science and technology	201		3.15	
• Social science and humanities	115			2.69	2.69	• Chemical science and technology	206		3.16	3.16
• Agricultural sciences	201				2.84	• Agricultural sciences	202		3.18	3.18
• Food science and technology	127					• Food science and technology	128			3.28
Significance ††		*1.000*	*0.055*	*0.130*	*0.058*	*Significance* ††		*0.200*	*0.071*	*0.051*

† Duncan's test compares means for groups in homogeneous subsets when equal variances are assumed.
†† When the significance test is above the threshold = 0.05, the null hypothesis (no differences of means) cannot be rejected.

(Z-TEST – COLUMN PROPORTION COMPARISONS)†

(6a) Attitudinal dimension †		Subset for α = 0.05			(6b) Experiential dimension †		Subset for α = 0.05		
Research fields	N	1	2	3	Research fields	N	1	2	3
• Biology and biomedicine	242	57.4%			• Natural resources	225	19.6%		
• Natural resources	274	60.9%	60.9%		• Agricultural sciences	178	19.7%	19.7%	
• Physical science and technology	204	62.3%	62.3%		• Biology and biomedicine	190	21.1%	21.1%	
• Social science and humanities	116		75.0%	75.0%	• Physical science and technology	166	28.9%	28.9%	28.9%
• Chemical science and technology	205			77.1%	• Social science and humanities	107	32.7%	32.7%	32.7%
• Agricultural sciences	202			79.7%	• Materials science and technology	174		33.3%	33.3%
• Materials science and technology	200			84.0%	• Food science and technology	120		35.0%	35.0%
• Food science and technology	128			89.8%	• Chemical science and technology	176			39.2%