FACTORS INFLUENCING THE EXTENT OF EUROPEAN UNIVERSITY-BUSINESS COOPERATION

PART OF THE DG EDUCATION AND CULTURE STUDY ON THE COOPERATION BETWEEN HIGHER EDUCATION INSTITUTIONS AND PUBLIC AND PRIVATE ORGANISATIONS IN EUROPE

Science-to-Business Marketing Research Centre
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A summary of findings

The study

This report presents the findings related to the factors affecting the extent of university-business cooperation that have been found to exist in Europe. These results derive from a fifteen and a half month study on the cooperation between higher education institutions[1] (HEIs) and public and private organisations in Europe. The study was conducted by the Science-to-Business Marketing Research Centre, Germany (S2BMRC) for the DG Education and Culture at the European Commission (EC) during 2010 and 2011.

The main components of the project are in-depth qualitative interviews with 11 recognised UBC experts as well as a major quantitative survey. The survey was translated into 22 languages and sent to all registered European HEIs (numbering over 3,000) in 33 countries during March 2011. Through this, a final sample population of 6,280 academics and HEI representatives was achieved making the study the largest study into cooperation between HEIs and business yet completed in Europe. Further, 30 good practice UBC case studies have been created to provide positive examples of European UBC.

Why do some academics and HEIs engage in UBC and not others?

Factors affecting European UBC (Factor level)

The reasons why some academics and HEIs engage in UBC and others do not can be partly answered in the 'factor level of UBC'. **Some factors are found to influence the extent of UBC for academics and HEIs including: benefits, drivers and barriers of UBC** (as perceived by the academic or HEI) **as well as situational factors such as age, gender, years working in a HEI or business and the country of the respondent.**

Perceived benefits of UBC

Academics were asked to assess a series of statements relating to the perceived benefits of UBC for the following UBC stakeholders: students, HEIs, business and academics (personal benefits). It was found that academics did indeed recognise the high degree of benefits from successful UBC for students and business as well as the ability of UBC to 'achieve the mission of the HEI' at a medium level. However, the academics perceived the personal benefits they receive from UBC at a significantly lower extent. Within the study, academics state that UBC rarely increases their standing in their HEI or their chances of promotion. Furthermore, academics rate 'inclusion of UBC as part of the assessment of work performance' and 'the provision of incentives for academics to encourage UBC' as the lowest developed *strategies* (as did HEI representatives). In other words, **academics do not recognise the benefits of UBC for themselves or their research and especially not in respect of their standing within the HEI or their chances of promotion.** All of these factors highlight that academics perceive personal benefits of UBC to be low and this could be another reason for the low extent of UBC.

[1] *HEIs* are understood to mean all types of institutions, which provide higher education. These institutions must be formally recognised by the relevant national/regional authority and includes:

- Universities,
- Universities of applied sciences,
- Polytechnics /technical universities,
- Colleges and tertiary schools.

Furthermore, HEI representatives were asked to assess the benefits of UBC for the students, business, the HEI itself and for society. From the perspective of the HEIs, they rated the highest benefits for students, followed by business, then the ability of UBC to contribute to the mission of the HEI with the lowest benefits perceived for society. There was a significant difference between the perception of the academics and the HEIs in respect to the extent that UBC supports the HEI in achieving its mission with HEIs perceiving these benefits to be higher.

Finally, the effect of perceived benefits from UBC was tested against the extent of UBC and the results show that **the higher the perceived benefits, the higher the extent of UBC carried out;** an outcome that was true for both academics and HEIs.

Perceived barriers to UBC

All academics, regardless of their experience or extent of UBC, see the importance of barriers quite similarly. **The vast majority of academics of all levels of UBC experience agree that funding barriers and bureaucracy within the HEI are the most relevant barriers.** Further, they believe that the main responsibility for funding UBC rests with the HEI so thus, see the main barriers to UBC to reside within the HEI.

All HEI representatives with any degree of experience assessed the barriers similarly for HEIs. **The main barriers seen by most HEI representatives are almost entirely focussed on the lack of funding** whilst bureaucracy is a factor not seen as such a barrier by HEI representatives. HEI representatives perceive the responsibility of funding UBC to be with governments and rated HEI-government relations as the highest source of barriers.

Barriers to UBC are perceived by all academics and HEIs similarly, although in various cases they can be overcome by the presence of high drivers.

Perceived drivers of UBC

Regarding the drivers of UBC, the study shows that the perceived level of UBC drivers significantly affects the extent of UBC for academics and HEIs. **This means that those academics or HEIs perceiving higher drivers for UBC are generally more engaged in UBC than those perceiving low drivers for UBC.**

The results show that the most important drivers for both HEIs and academics concern their relationships with businesses. For both academics and HEIs, the existence of mutual trust, mutual commitment and shared goals are rated as essential drivers, followed by drivers relating to the UB relationship. HEI representatives (management and professionals involved with UBC) generally perceive the UBC drivers in existence for the HEI to be significantly higher than academics do for their own UBC.

Drivers and barriers are related

A barrier provides a hindrance or obstacle to do something, while a driver provides the motivation to do that. Funding has been listed by both academics and HEIs as the highest barrier to UBC, meaning that they perceive that UBC cannot occur if there are no funds available. However, both academics and HEIs did not assess the 'possibility to access funding / financial resources for working with business' as one of the main drivers of UBC. Thus funding alone is not a sufficient incentive for academics to cooperate. Instead, mutual trust, commitment and a shared goal were the highest rated drivers. This means that even with the lack of funds as the highest barrier (obstacle) owing to the impossibility of cooperating without funds, **the presence of funds is not enough to cooperate if the 'relationship drivers' or perceived benefits (motivators) are not developed.**

Situational factors affecting UBC

Academics' personal characteristics play a role in influencing the extent of UBC. In respect to gender, males perceived a higher extent of cooperation in some UBC types and females in others, whilst regarding age, older academics usually undertake higher UBC than younger ones. Likewise, conditional factors, such as years working in the HEI, years working in business, the area of knowledge, the type of HEI they work for or the country where the HEI is located have been found to be reliable predictors of the extent of UBC carried out by academics. It has been found that those with higher development of UBC are those with more than ten years of experience working in HEIs, those with more than two years of experience working in business, those working in the area of technology and engineering, those in technical universities and those in eastern European countries.

In respect to HEIs, the country where the HEI is located has a large influence on their perceived extent of UBC with HEI representatives from Ireland, the United Kingdom and Romania rating themselves the highest. When the results of HEI representatives are added to the results from the academics, then the survey population from Sweden, Denmark and the United Kingdom rated themselves the highest. Further, the type of HEI also plays a role in the type of cooperation they undertake; with polytechnics and universities of applied sciences having the highest level of cooperation. Both factors are relevant for governments to consider in the design and implementation of UBC policies.

Whilst 'situational factors' help to understand European UBC; they provide only a few implementable options for increasing UBC.

The factor level of UBC informs us about the factors that have an influence on an academic or HEI's likely extent of UBC

It was found that benefits, drivers, barriers, situational factors all have a substantial influence on European UBC

Introduction

The following chapter explains various elements related to UBC that are important in understanding the paper.

Paper objective

The following section will endeavour to answer the following research question in respect to UBC:

Benefits, drivers, barriers and situational factors

C. Which benefits, drivers, barriers and situational factors exist and how relevant are they?

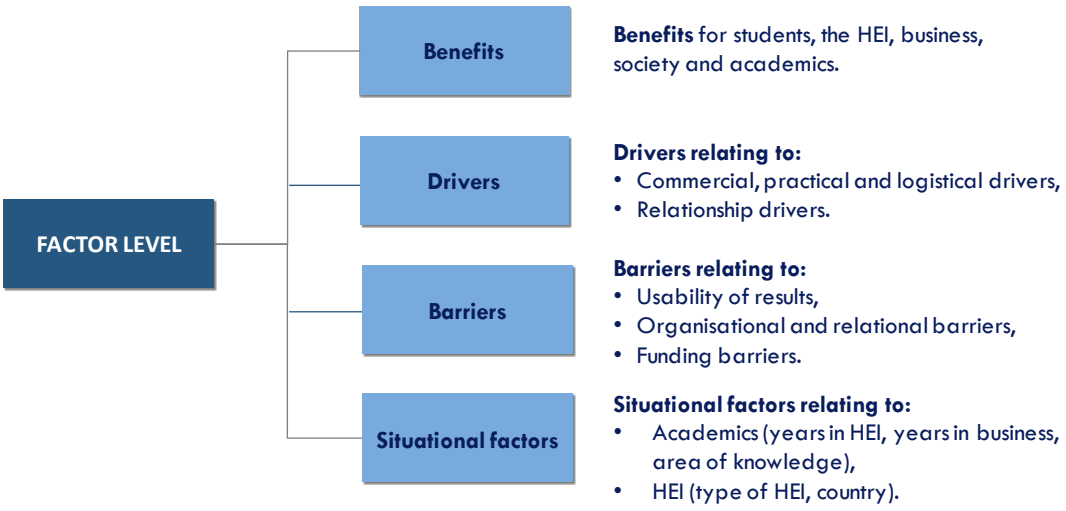


Diagram: Factors influencing the extent of European UBC
Davey, T., et al (2011)

Definitions - benefits, drivers, barriers and situational factors

The 'factor level of UBC' explains the factors that influence the extent of UBC for academics and HEIs and includes: benefits, situational factors, drivers and barriers. Through a review of relevant reports and articles, qualitative interviews and the practical experience, the following drivers, barriers and situational factors for UBC were identified.

Benefits

Benefits are the benefits that are received by the academic or HEI in undertaking UBC. They can be arranged in the following categories: benefits for students, benefits for business, benefits for society, benefits for HEIs and personal benefits for academics.

Type of benefit	Explanation
Benefits for students	Factors that benefit students, including: • Improving the learning experience of students, • Increasing skills and graduate development, • Improving the employability of future graduates.
Benefits for business	Factors that benefit business, including: • Improves the performance of business.
Benefits for society	Factors that benefit society, including: • Increasing local employment, • Benefitting the local industry, • Increasing local GDP and disposable income, • Creating a variety of range of social and recreational benefits, • Improving regional productivity.
Benefits for HEIs	Factors that benefit HEIs, including: • Achieving the mission of the HEI.
Personal benefits for academics	Benefits that relate to the personal benefits for the academic, including: • Increasing the academics reputation in the field, • Being vital for personal research, • Increasing chances of promotion and employability, • Improving the standing within the HEI.

Drivers

Drivers are those factors that facilitate the academic or the HEI to engage in UBC. In essence they are factors that provide motivation to undertake UBC and can be grouped under two headings: relationship drivers and business drivers.

Type of driver	Explanation
Relationship drivers	Drivers that relate to the relationship between the academic/HEI and the business, and these include: • Existence of mutual trust, • Existence of mutual commitment, • Having a shared goal, • Understanding of common interest by different stakeholders (e.g. HEIs; business; individuals; students), • Prior relation with the business partner, • Cooperation as effective means to address societal challenges and issues.

Business drivers	Drivers that relate to the business factors that motivate UBC; and these include: • Employment by business of HEI staff and students, • Interest of business in accessing scientific knowledge, • Possibility of accessing funding / financial resources for working with business, • Short geographical distance of the HEI from the business partner, • Flexibility of business partner, • Access to business-sector research and development facilities, • Commercial orientation of the HEI.

Barriers

Barriers are those obstacles that restrict or inhibit the ability of the academic or HEI to engage in UBC and can be grouped under three headings: usability of results, funding barriers and relational barriers.

Type of barrier	Explanation
Usability of results	Barriers that relate to the way the results of UBC (mainly R&D results) are utilised by business; and these include: • The focus on producing practical results by business, • The need for business to have confidentiality of research results, • Business fears that their knowledge will be disclosed.
Funding barriers	Barriers that relate to the provision of funds for UBC from both internal and external sources; and these include: • Lack of external funding for UBC, • Lack of financial resources of the business, • Lack of HEI funding for UBC, • The current financial crises.
Relational barriers	Barriers that relate to or affect the actual UBC relationship or interactions, occurring between the academic /HEI and the business; and these include: • Business lack awareness of HEI research activities / offerings, • The limited absorption capacity of SMEs to take on internships or projects, • Differing time horizons between HEI and business, • Differing motivation / values between HEI and business, • HEIs lack awareness of opportunities arising from UBC, • Bureaucracy within or external to the HEI, • Limited ability of business to absorb research findings, • Differing mode of communication and language between HEI and business, • A lack of contact people with scientific knowledge within business, • Difficulty in finding the appropriate collaboration partner , • No appropriate initial contact person within either the HEI or business.

Situational factors

Situational factors describe demographic and other status indicators that were tested for their influence on the extent of UBC. They are also used to describe the sample population and to check the representativeness of the population.

Type of situational factor	Explanation
Age	The age of the respondent and its effect on the extent of UBC by academics.
Gender	The gender of the respondent and its effect on the extent of UBC by

	academics.
Years in HEI	The number of years that a respondent has been employed at a HEI and its effect on the extent of UBC by academics.
Years in Business	The number of years that a respondent has been employed or worked in business, prior to working in the HEI, and its effect on the extent of UBC by academics.
Area of knowledge	The area of knowledge in which the respondent is employed and its effect on the extent of UBC by academics.
Denomination of HEI	The denomination of the HEI by the respondent and its effect on the extent of UBC by academics as well as the extent of UBC by HEIs.
Country	The country in which the HEI of the respondent is located and its effect on the extent of UBC by academics as well as the extent of UBC by HEIs.

Abbreviations

EC	European Commission
EEA	European Economic Area
EU	European Union
EUA	European University Association
HEI	Higher Education Institution
ICT	Information and Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
LLL	Lifelong Learning
MUAS	Münster University of Applied Sciences
NQF	National Qualifications Framework
PhD	Doctorate of Philosophy
R&D	Research and Development
SME	Small- and Medium-sized Enterprise
S2BMRC	Science-to-Business Marketing Research Centre
TTO	Technology Transfer Office
UB	University-Business
UBC	University-Business Cooperation
UPB	University professional working with business
VU	Free University of Amsterdam

Explanation of the results

The following information provides instructions for the comprehension of results.

Who answered the survey (academic or HEI)

Questions were posed to two groups within HEIs. These groups were asked about their perception of UBC:

1. Individual academics were asked to respond on behalf of themselves
2. HEIs representatives (HEI managers and university professionals working with industry) were asked to respond on behalf of their HEI.

	Focus	Responded on behalf of	Colour code for results
1	Academics	Indv. academics	
2	HEIs	HEI management and university professionals working with industry	

Colour codes have been used though the report to identify those results received from the academic (green) and those results received from the HEI (orange).

Qualitative interviews

Comments and findings from experts in UBC

Content found in a box like this is relevant information from the qualitative interviews with experts/practitioners in European UBC.

Case studies results

Content found in a box like this include relevant information from the cases studies analysis carried out as part of the entire study.

Hypotheses testing

During the secondary research review, many statements about UBC were gathered and converted into hypotheses. Using the data from the survey, it was tested whether the hypotheses could be rejected or not.

The source of the hypothesis is stated next to the hypothesis.

"Where the hypothesis came from is detailed here" [2]

The hypothesis is stated here ***The result is here***

The hypothesis has been confirmed by the results of the survey
The hypothesis has not been confirmed by the results of the survey

[2] Crosier *et al* (2007)

Benefits in UBC

Perceptions of high benefits & incentives drive UBC
The perception of self-benefit is a major factor in UBC.
The higher the perceived benefits, the higher the extent of UBC carried out.

Explanation

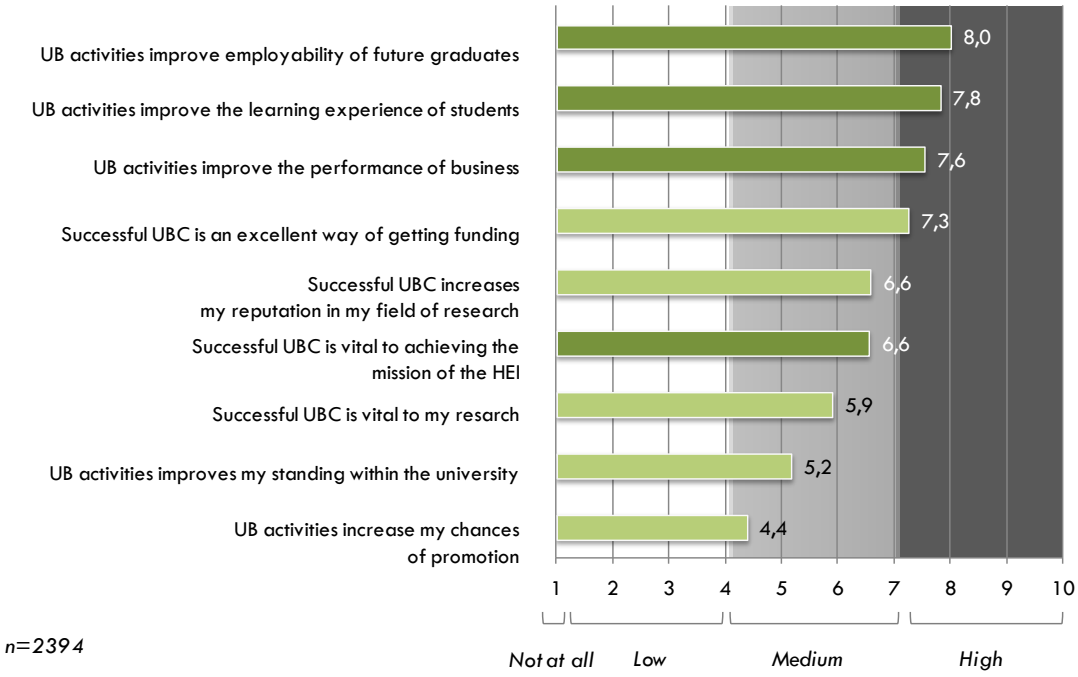
A series of benefits for European UBC were identified through literature and a round of expert interviews. They are presented in two sections relating to those benefits observed by academics (in green) and those perceived by HEI management (in orange). The results for the academics are separated into 'benefits' for students, business or the HEI' and benefits for academics' by colour difference. In the study, both academics and HEI representatives were asked to indicate the extent to which there were benefits coming from UBC on the following scale:

1 no UBC >1 – 4 low >4 – 7 medium >7 - 10 high

In the tables, the figures represent the mean UBC value of respondents on the scale.

Type of benefits

Benefits from UBC assessed by academics



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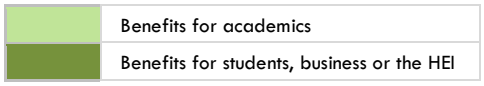
Academics perceive the benefits from UBC as follows:

- the current or future benefits of UBC for students are rated the highest,
- they then agree that UBC provides benefits for the businesses,
- then assess benefits for the HEI (mission) as slightly lower , and



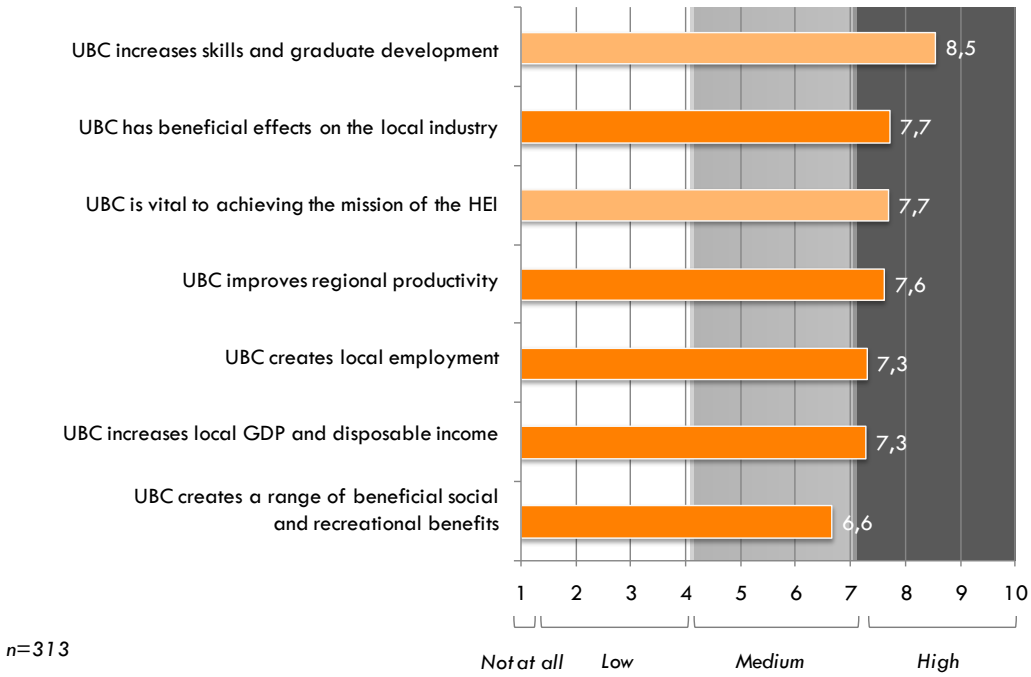
- they rate the benefits of UBC for themselves the lowest, especially those regarding the incentives provided by their HEIs.

Academics see the benefits of UBC for other stakeholder groups higher than their personal benefits. For academics, UBC remains primarily a potential method of getting funds, without substantial importance for their own research or as an incentive for promotion.

Comments and findings from UBC expert interviews

One of the experts interviewed believes that the main benefits for HEIs from UBC are as follows: income, reputation and benefits of students, and for business, primarily new products and technologies. The respondent observed that business have become rather more robust and diversified in their relationships with HEIs which includes seeing HEIs as a place to find good employees.[3] A further expert comments that incentives, recognition, hours off lecturing, the provision of special infrastructure and facilities, as well a positive image of UBC with peers and heads of department were also seen as crucial. In the light of the results above, these comments seem extremely relevant in creating a higher perceived personal benefit for academics from UBC.[4] An additional interviewee stated that the HEI can influence the willingness of the researcher to work with industry. [5]

Benefits from UBC assessed by HEI representatives



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HEI representatives identify the benefits from UBC as follows:

- the highest benefits from UBC are for students (similar to academics),
- secondly, businesses and local industry receive the next highest benefits,
- then the positive contribution to the mission of the HEI, and
- the lowest perceived benefit is for society.

[3] Expert interview: respondent 1
[4] Expert interview: respondent 5
[5] Expert interview: respondent 8

The HEI representatives rate the contribution of UBC to the mission of the HEI significantly higher than the assessment of the academics. Further, for both academics and HEIs, the effect of perceived benefits on the amount of UBC undertaken was tested and the results show that the higher the perceived benefits, the higher the extent of UBC carried out.

Comments and findings from UBC expert interviews

The respondent said that one of the reasons why UBC is so well developed in Finland is that all the associations of labour market and employees and other stakeholders see the importance UBC.[6]

Key finding	Academics rate the benefits of UBC for themselves the lowest, especially those regarding the incentives provided by their HEIs. HEI representative rated the positive contribution to the mission of the HEI lower than the benefits for students and local industry. Both groups rated as highest the benefits to students from UBC.
Recommendation(s)	Address the lack of understanding or perception of the personal benefits of UBC for academics with more incentives and better information.

[6] Expert interview: respondent 8

Barriers to UBC

Lack of funding and excess of bureaucracy at all levels (HEI, national, European) are the highest barriers to UBC …
however removal of barriers does not create UBC

Explanation

A series of barriers for European UBC were identified through literature and a round of expert interviews. These barriers were considered in the study and grouped in 3 categories using a factor analysis. In the study, both academics and HEI representatives were asked to indicate the extent to which there were barriers to UBC on the following scale:

1 no UBC >1 – 4 low >4 – 7 medium >7 - 10 high

In the tables, the figures represent the mean UBC value of respondents on the scale.

Type and grouping of barriers

Usability of results	**Extent of relevance (1-10)**	
• The focus on producing practical results by business, • The need for business to have confidentiality of research results, • Business fear that their knowledge will be disclosed.	**ACAD**	**6.1** (Medium)
	HEI	**6.0** (Medium)

Funding barriers	**Extent of relevance (1-10)**	
• Lack of external funding for University-Business cooperation, • Lack of financial resources of the business, • Lack of HEI funding for UBC, • The current financial crises.	**ACAD**	**6.5** (Medium)
	HEI	**6.8** (Medium)

Relational barriers	**Extent of relevance (1-10)**	
• Business lack awareness of HEI research activities / offerings, • The limited absorption capacity of SMEs to take on internships or projects, • Differing time horizons between HEI and business, • Differing motivation / values between HEI and business, • Universities lack awareness of opportunities arising from UB-cooperation, • Bureaucracy within or external to the HEI , • Limited ability of business to absorb research findings, • Differing mode of communication and language between HEI and business, • A lack of contact people with scientific knowledge within business, • Difficulty in finding the appropriate collaboration partner, • No appropriate initial contact person within either the HEI or business.	**ACAD**	**6.4** (Medium)
	HEI	**6.2** (Medium)

Focus for barriers of UBC

Are scientifically proven to be structured into three areas:

1. Usability of results
2. Funding
3. Relational barriers.

Funding barriers are the biggest barriers for UBC (assessed by both academics and HEI representatives).

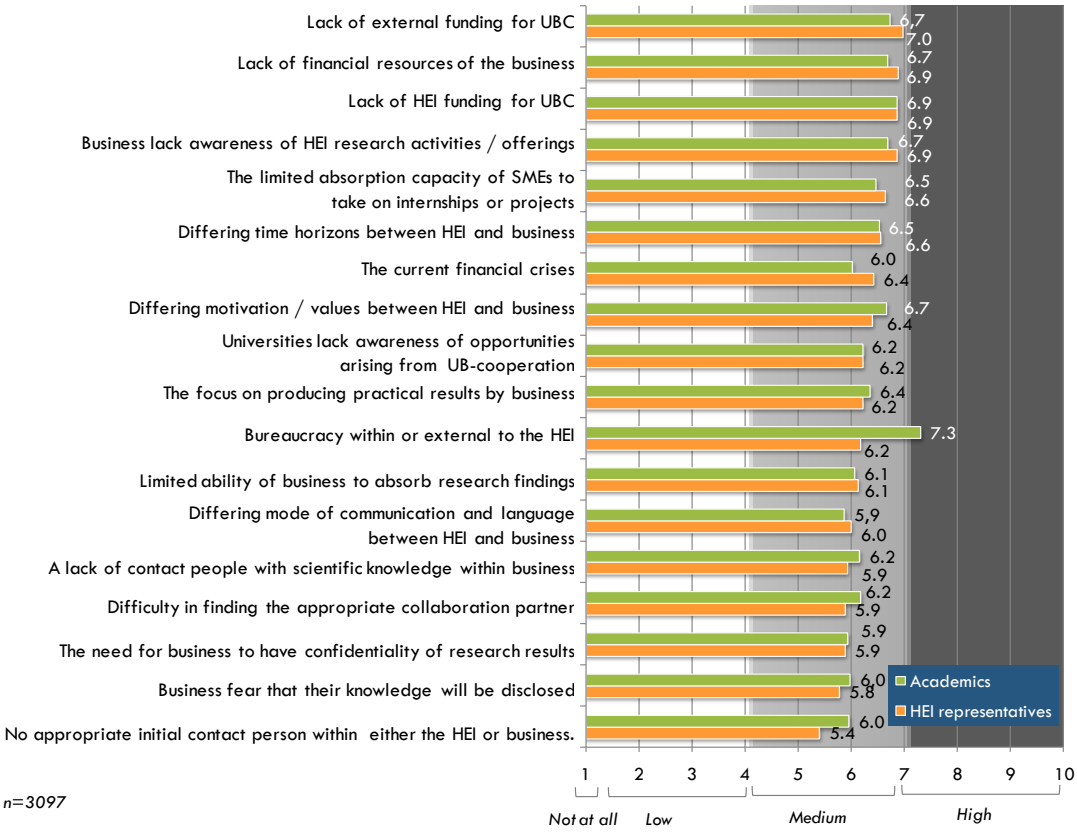
NB Barriers were determined through two rounds of research (secondary and primary) and then further tested in a pre-test.

* A factor analysis was performed to determine this

Hypothesis source	***Hypothesis***	***Result***
"The most prevailing structural barriers companies and universities have to overcome are the bureaucracy and the difficulty of finding an appropriate cooperation partner."[7]	The bureaucracy within or external to the HEI for the UBC is relevant / very relevant	✓

[7] Corsten (1987)

Extent of barriers



Funding for UBC (i.e. lack of external funding, lack of financial resources of business, lack of HEI funding) is identified as the most important barrier, or more specifically, how the lack of it hinders both HEIs and academics in undertaking UBC. Academics also perceive the bureaucracy within or external to the HEI as an important barrier in undertaking UBC, whereas the HEIs rated the importance of this barrier significantly lower.

Hypothesis source	***Hypothesis***	***Result***
"Many of the barriers that exist are similar across the EU."[8]	Barriers do not present significant differences among countries/regions	✗

Hypothesis source	***Hypothesis***	***Result***
"Funding is extremely important (Respondent 8) and a key factor for universities in undertaking UBC is money" [9]	The possibility to access funding/financial resources for working with business is relevant / very relevant	✓

[8] Expert interviews: respondent 8
[9] Expert interviews: respondent 10

Key finding	All academics and HEIs see the importance of barriers quite similarly regardless of their level of UBC. The highest barriers for academics are related to bureaucracy and funding, while the ones for HEIs exclusively with funding.
Recommendation(s)	Reduce the highest barriers, particularly ensuring that funds are available to encourage UBC as well as simplifying the bureaucratic procedures of UBC

Drivers of UBC

Personal relationships drive UBC. It's a people game!

Existence of mutual trust and commitment are the most important drivers of UBC for both academics and HEIs. Those academics or HEIs perceiving higher drivers for UBC are more engaged in UBC than those perceiving low drivers for UBC

Explanation

A series of drivers of European UBC were identified through literature and a round of expert interviews. These drivers were considered in the study and grouped in 3 categories using a factor analysis. In the study, both academics and HEI representatives were asked to indicate the extent to which drivers facilitated their extent of UBC undertaken on the following scale:

1 no UBC >1 – 4 low >4 – 7 medium >7 - 10 high

In the tables, the figures represent the mean UBC value of respondents on the scale.

Type and grouping of drivers

Relationship drivers	**Extent of facilitation (1-10)**	
• Existence of mutual trust, • Existence of mutual commitment, • Having a shared goal, • Understanding of common interest by different stakeholders (e.g. universities; business; individuals; students), • Prior relation with the business partner, • Cooperation as effective means to address societal challenges and issues.	**ACAD**	**6.7** (Medium)
	HEI	**7.0** (High)

Business drivers	**Extent of facilitation (1-10)**	
• Employment by business of HEI staff and students, • Interest of business in accessing scientific knowledge, • Possibility to access funding / financial resources for working with business, • Short geographical distance of the HEI from the business partner • Flexibility of business partner, • Access to business-sector research and development facilities • Commercial orientation of the HEI.	**ACAD**	**5.6** (Medium)
	HEI	**6.7** (Medium)

Focus for drivers of UBC

Are scientifically proven to be structured into two areas:

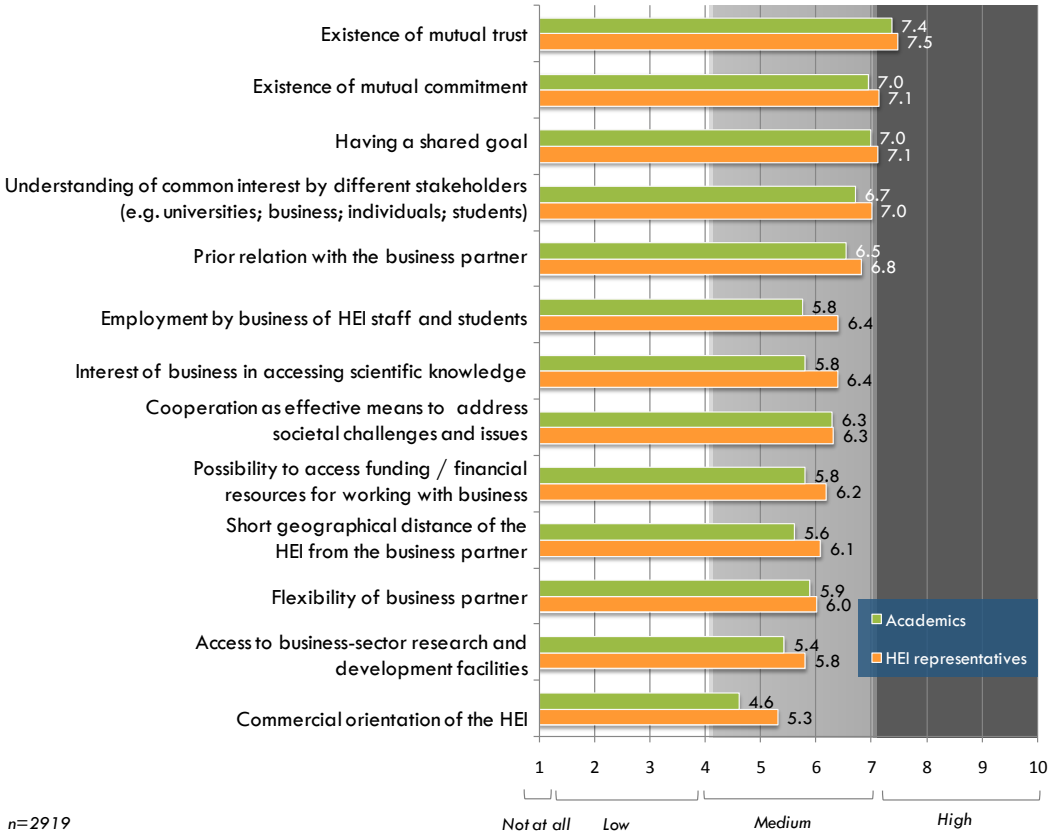
1. Relationship drivers
2. Business drivers

Relationship drivers are the biggest facilitators of UBC (assessed by both academics and HEI representatives).

***NB** Drivers were determined through two rounds of research (secondary and primary) and then further tested in a pre-test.*

* A factor analysis was performed to determine this

Extent of facilitation of drivers



The drivers that facilitate both HEIs and academics in their UBC are perceived similarly by both groups. The drivers related to mutual trust, commitment and respect are clearly perceived to be important in the facilitation of UBC, whilst 'the commercial orientation of the HEI' as well as 'the access to business-sector research and development facilities' are perceived to be the lowest facilitators of UBC.

Hypothesis source	*Hypothesis*	*Result*
The most important drivers are trust, commitment and communication/integration[10]	Trust and commitment are the most important drivers of UBC	✓

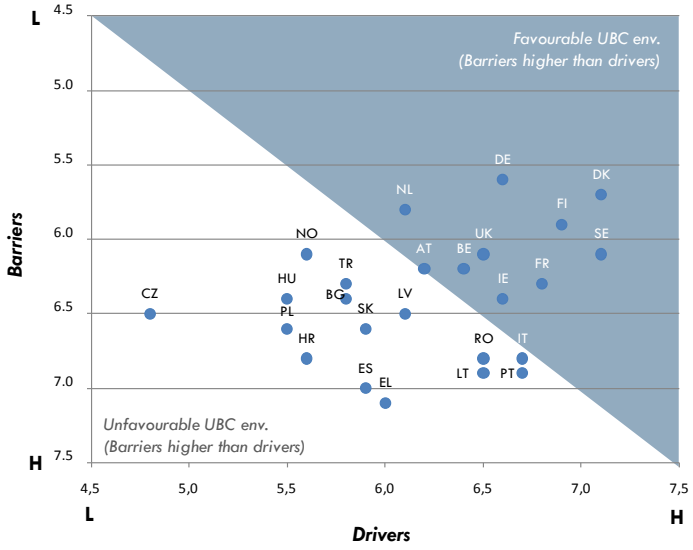
Key finding	Relationship drivers, especially mutual trust, commitment and respect are the highest rated drivers by both groups. Contrary, business drivers are perceived lower facilitators of UBC.
Recommendation(s)	Support or increase the most important drivers while increasing the awareness of the existence and the benefits of UBC drivers for academics and HEI representatives as a way to increase the extent of UBC.

[10] Corsten (1987)

Comparing drivers and barriers

Comparing drivers and barriers creating a favourable environment for UBC

For UBC to prosper, it is preferable to create an environment where the drivers and high and the barriers are low. Approximately half of the countries fit into the favourable UBC situation of high drivers and low barriers lead by Denmark, Finland, Sweden and Germany. It is revealed that the Czech Republic has very low drivers for UBC whilst Greece and Spain had the highest UBC barriers.



1 = "Not at all developed yet" to 10 = "Highly developed"

9.9 Highest driver /lowest barrier mean

Country	Short Code	Drivers	Barriers
Austria	AT	6.2	6.2
Belgium	BE	6.4	6.2
Bulgaria	BG	5.8	6.4
Croatia	HR	5.6	6.8
Czech Republic	CZ	4.8	6.5
Denmark	DK	**7.1**	5.7
Finland	FI	6.9	5.9
France	FR	6.8	6.3
Germany	DE	6.6	**5.6**
Greece	EL	6.0	7.1
Hungary	HU	5.5	6.4
Ireland	IE	6.6	6.4
Italy	IT	6.7	6.8
Latvia	LV	6.1	6.5
Lithuania	LT	6.5	6.9
Netherlands	NL	6.1	5.8
Norway	NO	5.6	6.1
Poland	PL	5.5	6.6
Portugal	PT	6.7	6.9
Romania	RO	6.5	6.8
Slovakia	SK	5.9	6.6
Spain	ES	5.9	7.0
Sweden	SE	**7.1**	6.1
Turkey	TR	5.8	6.3
United Kingdom	UK	6.5	6.1

Situational factors in UBC

Situational factors help to explain UBC
...but only a few of them have practical implications

Explanation

A series of situational factors for European UBC were identified through literature and a round of expert interviews. They are presented in two sections relating to those benefits observed by academics (in green) and those perceived by HEI management (in orange). In the study, both academics and HEI representatives were asked to indicate the extent to which they work with business in the *8 Types of UBC*. The following section looks at the results from a number of demographic and situational viewpoints to identify those factors that affect UBC. A minimum of 30 responses for each of the factors were required to be used in the analysis. In the tables, the figures represent the mean UBC value of respondents on the scale:

1 no UBC >1 – 4 low UBC >4 – 7 medium UBC >7 - 10 high UBC

Type of situational factors

Gender (academic)

Highest developed types for males:

- Collaboration in R&D,
- Mobility of students.

Highest developed types for females:

- Collaboration in R&D,
- LLL.

Significant differences between males and females (males significantly higher cooperation) were found for:

- Collaboration in R&D,
- Mobility of students,
- Commercialisation of R&D,
- Entrepreneurship,
- Governance.

Years in HEI (academic)

It was found with only two exceptions, those **academics with more than 10 years in a HEI cooperate the most in the *8 Types of UBC*.**

Age (academic)

In respect to age, it would be expected that the older a person is, the more likely they are to have engaged in UBC. The results reflect this hypothesis. Most cooperation types showed that **the older the academic, the higher the cooperation.**

Hypothesis source

"Focus activities on those younger academics who are more open to working with industry"[11]

Hypothesis and result

Younger academics have a higher cooperation with universities than the older ones ✗

[11] Expert interviews: respondent 8

Years in business (academic)

	Collaboration in R&D	Mobility of academics	Mobility of students	Commercialisation of R&D results	Curriculum development & delivery	Lifelong learning (LLL)	Entrepreneurship	Governance	Total UBC*
None	4.7	2.6	3.5	3.6	3.3	3.4	2.7	2.4	3.4
>0 - 2	4..1	2.8	4.3	4.2	3.9	3.9	3.7	3.0	3.9
3 – 5	5.4	2.9	4.7	**4.7**	4.1	4.4	3.6	3.3	4.2
6 – 9	**5.6**	**3.4**	4.9	4.5	**4.8**	4.5	3.7	3.4	4.4
10 - 19	5.3	3.1	**5.1**	4.5	4.3	4.4	4.0	3.5	**4.5**
20 + years	5.1	3.2	**5.1**	4.4	4.6	**4.7**	**4.3**	**3.7**	**4.5**

Scale: 1 = none, >1 - 4 = low ; >4 - 7 = medium ; >7 - 10 = high

Those academics with 10+ years working in business have the highest Total UBC.

The amount of U-B cooperation is significantly lower for those academics having less than 2 years of experience in business.

5 years working in business is the 'tipping point' at which each extra year an academic works in business adds little more to their extent of UBC.
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9.9 Highest per type of UBC
9.9 Highest per years in business

Area of knowledge (academic)

	Collaboration in R&D	Mobility of academics	Mobility of students	Commercialisation of R&D results	Curriculum development and delivery	Lifelong learning (LLL)	Entrepreneurship	Governance	Total UBC*
Health, biomedical science	4.7	2.5	3.3	3.6	3.1	3.1	2.5	2.0	3.2
Technology and Engineering	**6.0**	**3.2**	**5.0**	**4.6**	**4.3**	4.3	**3.7**	3.2	**4.4**
Social Sciences	4.4	2.8	4.3	3.9	4.0	**4.4**	**3.7**	**3.3**	3.9
Humanities	3.9	2.8	4.0	3.0	3.6	3.5	3.1	2.7	3.4

Scale: 1 = No UBC, >1 - 4 = low ; >4 - 7 = medium ; >7 - 10 = high

9.9 Highest per type of UBC
9.9 Highest per area of knowledge

Technology and Engineering have the highest level of UBC

Areas of focus

Health, biomedical science
- Collaboration in R&D

Technology and Engineering:
- Collaboration in R&D
- Mobility of students
- Commercialisation of R&D
- Curriculum dvlp. & delivery
- Lifelong learning

Social sciences
- Collaboration in R&D
- Mobility of students
- LLL

Humanities
- Mobility of students

NB To be an area of focus, the perception needed to be over 4

Hypothesis source	*Hypothesis*	*Result*
"UBC occurs mostly in technological areas and to a smaller degree in social areas."[12]	The degree of UBC within academics of technological areas is higher than UBC in social areas	✓

[12] Expert interviews: respondent 10:

Type of HEI (academic)

	Collaboration in R&D	Mobility of academics	Mobility of students	Commercialisation of R&D results	Curriculum development and delivery	Lifelong learning (LLL)	Entrepreneurship	Governance	Total UBC*
University	4.8	2.8	3.9	3.9	3.6	3.8	3.2	2.8	3.7
University of applied sciences	**5.7**	2.9	5.2	**4.5**	4.0	3.7	3.4	3.1	4.1
Polytechnic university/ Technical university	5.4	**3.3**	4.8	4.4	**4.5**	4.5	4.0	3.2	**4.4**
School of …. **	5.2	3.0	**5.3**	3.8	**4.5**	**4.8**	**4.2**	3.2	4.3
College of … **	4.0	3.0	3.7	2.9	4.3	4.3	2.9	**3.5**	3.6

Scale: 1 = No UBC, >1 - 4 = low ; >4 - 7 = medium ; >7 - 10 = high

9.9 Highest per type of UBC

9.9 Highest per type of institution

NB To be an area of focus, the perception needed to be over 4 (i.e. at least a medium level of UBC)

Polytechnic universities have he highest level of UBC

Areas of focus

University
- Collaboration in R&D

University of applied sciences
- Collaboration in R&D
- Mobility of students
- Commercialisation of R&D results

Polytechnic / Technical universities
- Collaboration in R&D
- Mobility of students
- Commercialisation of R&D results
- Curriculum development and delivery
- LLL

School of…
- Collaboration in R&D
- Mobility of students
- LLL
- Entrepreneurship

College of…
- Curriculum development and delivery

Type of HEI (HEI)

	Collaboration in R&D	Mobility of academics	Mobility of students	Commercialisation of R&D results	Curriculum development and delivery	Lifelong learning	Entrepreneurship	Governance	Total UBC*
University	6.6	4.9	6.0	**5.7**	5.6	**6.0**	5.9	5.3	**5.8**
University of applied sciences	**6.7**	4.4	6.6	5.4	**5.9**	5.7	5.5	4.8	5.6
Polytechnic university / Technical university	6.6	**5.0**	6.4	5.5	**5.9**	**6.0**	**6.0**	5.2	**5.8**
School of … **	5.9	4.3	**7.0**	4.7	5.8	5.5	5.6	5.2	5.4
College of … **	5.8	4.4	6.5	5.0	6.0	5.9	5.6	**5.4**	5.5

Scale: 1 = No UBC, >1 - 4 = low ; >4 - 7 = medium ; >7 - 10 = high

9.9 Highest per type of UBC

9.9 Highest per type of institution

Areas of focus

University
- Collaboration in R&D

University of applied sciences
- Collaboration in R&D
- Mobility of students

Polytechnic / Technical Uni
- Collaboration in R&D
- Mobility of students

School of…
- Mobility of students

College of…
- Mobility of students

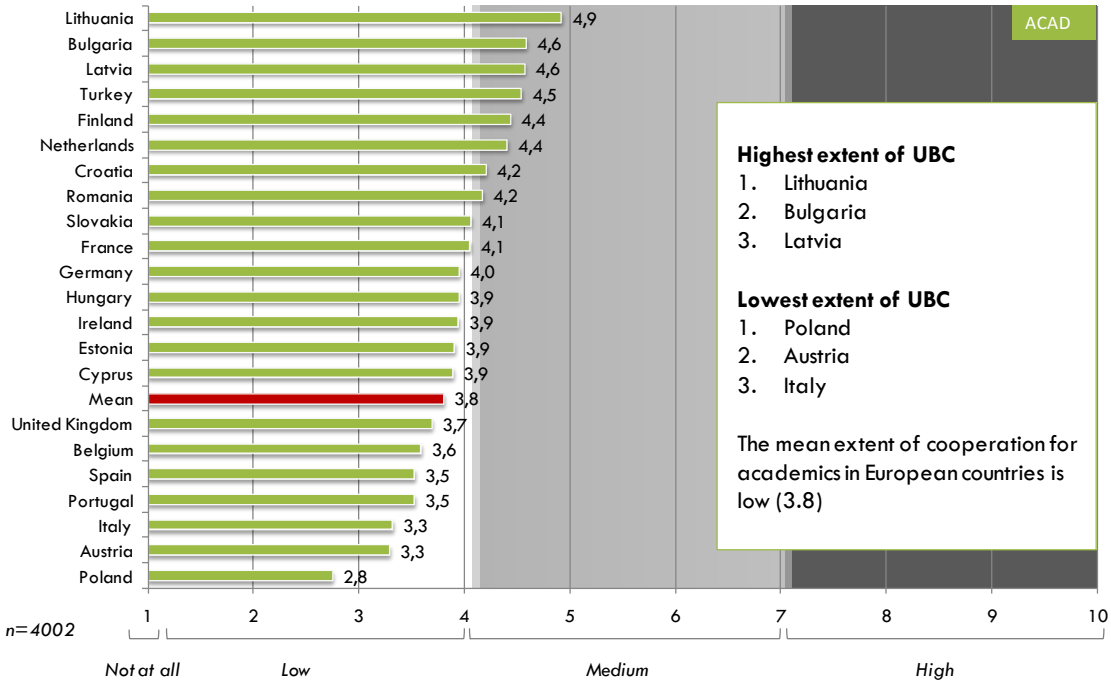
NB To be an area of focus, the perception needed to be >6

Hypothesis source	*Hypothesis*	*Result*
"Public universities of applied sciences have more UBC than traditional universities."[13]	Universities of applied sciences present a higher level of UBC	✓

[13] Stifterverband für die Deutsche Wissenschaft (2007)

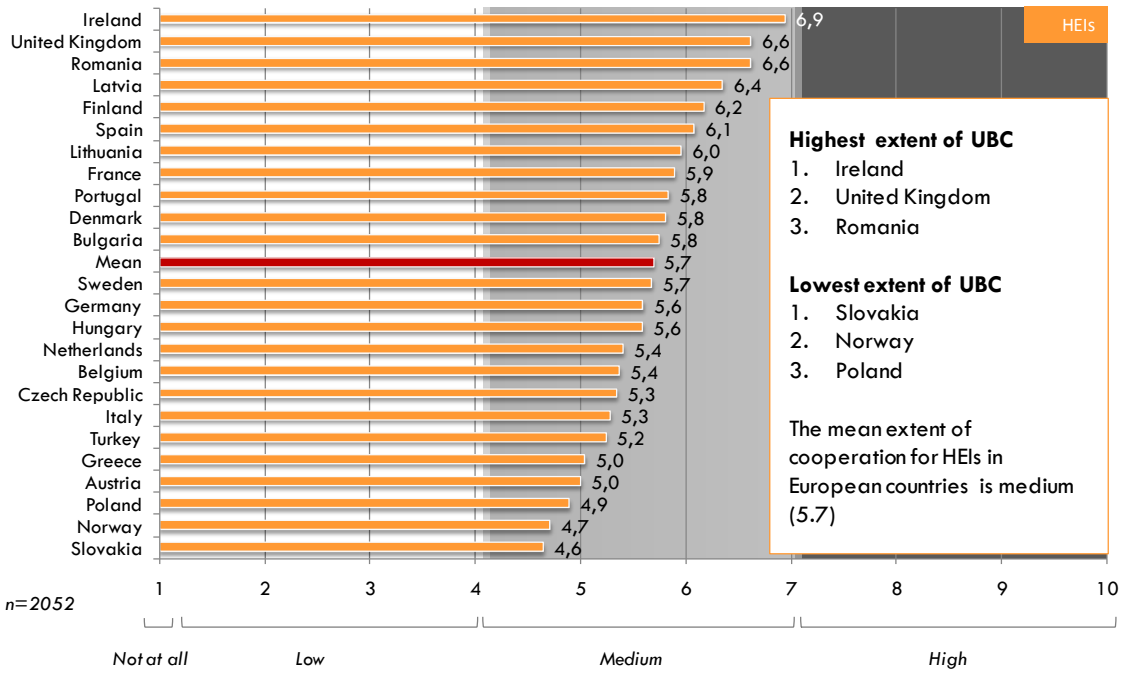
Country (academic)

Academics were asked to indicate to what extent they cooperate with business (mean of academic representatives in the country). A minimum of 30 responses were required.



Country (HEI)

HEI representatives were asked to indicate to what extent their HEI cooperates with business (mean of HEI representatives in the country). A minimum of 30 responses were required.



Hypothesis source	*Hypothesis*	*Result*
"The expert thinks that there is a trend, particularly in the UK, where HEIs work ever-more closely with companies, more so than in other countries".[14]	The degree of UBC is significantly higher within UK universities and businesses	✗

Key Finding	Situational factors have a substantial effect on European UBC. This provides greater understanding to all UBC stakeholders of the factors that influence UBC. *Years in business,* as an academic characteristic, and *country* of the HEI have the most significant effects, providing areas of focus for policy makers.
Recommendation(s)	Focus on *years of working in business* as a means for developing current and selecting future academics. Encourage and support academics to spend more than two years working in business or employ academics that fit the profile of high UBC. Partner HEIs from higher UBC countries with those from lower performing countries.

[14] Expert interview: respondent 2

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Science-to-Business Marketing Research Centre

The Research Centre Science-to-Business Marketing Research Centre at the Münster University of Applied Sciences in Germany developed the first strategic approach worldwide for successful commercialisation of research competencies, capacities and results with its concept of Science-to-Business Marketing.

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The Science-to-Business Marketing Research Centre (S2BMRC) is world recognised for the project partnership approach to university-business cooperation. Further highlights include:

- Co-developer of the 'Responsible Partnering Handbook'
- Leading centre for the development of approaches to university/industry partnerships, as used by Coventry University
- Development of the "Science Marketing Toolbox" including 58 instruments to assist Science Marketing
- Developer and publisher of the TechAdvance ™ Technology Evaluation Handbook which provides a method for the evaluation of technologies
- Organiser of the international 'Science-to-Business Marketing' Conferences held in Germany, Belgium, China, South Africa, Japan, Australia, France and Russia.
- We are regularly engaged to:
  - Conduct research in university-business cooperation
  - Present at conferences
  - Conduct workshops on this topic
- The S2BMRC team are also regular publishers of journal and news articles on this topic

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