

# Policy Brief

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This Policy Brief has been elaborated under the EU-funded project **PLATON+** ([www.platonplus.net](http://www.platonplus.net)) which aims to:

a) communicate socio-economic research results to policy makers, Civil Society Organisations and business communities across Europe, and

b) show ways of collaboration and bring into contact socio-economic researchers and researchers from other disciplines.

**PLATON+ Policy Briefs** communicate socio-economic relevant research results and key policy recommendations in a concise and non-technical format to policy-decision makers, Civil Society Organisations (CSOs) at European, national and regional level.

This Policy Brief discusses key findings and policy implications provided by the EU-funded projects “**Dynamics of Institutions and Markets in Europe**” (DIME) funded under Priority 7 ‘Citizens and governance in a knowledge based society’ of the 6th Framework Programme (FP6-CITIZENS) and “**The Changing Nature of Internationalization of Innovation in Europe: impact on Firms and the Implications for Innovation Policy in the EU**” (GLOBINN), funded under Theme 7 ‘Socio-economic sciences and the humanities’ of the 7th Framework Programme (FP7-SSH).

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## Internationalisation of R&D and Innovation

### Research context

In the transition towards a knowledge-based economy, firms are important players along with governments, workers, universities and communities. It has been shown that European firm performance in terms of innovation and Total Factor Productivity (TFP) lags behind their US counterparts. This phenomenon is a call for the active engagement of these players in the [internationalisation of innovation with the aim of catching up](#), as it has significant implications for the [competitiveness, knowledge base and social welfare of the EU](#). Its importance cannot be overstated, especially at a time when European firms and people are facing increasing challenges from other industrialised economies and emerging economies.

The [internationalisation of innovation of firms is defined as “engagement with foreign sources of innovation”](#). This is a current trend of firms with global perspectives following previous prevailing engagement with internationalised production and services. Firms choose to engage foreign innovative sources for several reasons:

1. The cost of conducting R&D is a major concern, especially for those activities generating standardised innovative products.
2. Improved communication technologies increase the ability of firms to monitor foreign innovation activities and co-ordinate global innovation network.
3. The increasing complexity and high demand for diversified innovative products featuring shorter life cycle forces firms to devote limited resources to core R&D activities by outsourcing certain types of technology.
4. Foreign markets require that multinational enterprises (MNEs) provide products that can fully adapt to local consumers’ preferences, which requires the combination of internal R&D effort and local knowledge.

This Policy Brief summarises the key research findings and policy messages generated from two research projects funded by the European Commission: “[Dynam-](#)

#### Research context

Internationalisation of innovation and its characteristics

Impact of Internationalisation on Firm Performance

Key Policy Messages

Further reading

ics of Institutions and Markets in Europe” (DIME) funded under Priority 7 ‘Citizens and governance in a knowledge based society’ of the 6th Framework Programme (FP6-CITIZENS) and “The Changing Nature of Internationalization of Innovation in Europe: impact on Firms and the Implications for Innovation Policy in the EU” (GLOBINN), funded under and Theme 7 ‘Socio-economic sciences and the humanities’ of the 7th Framework Programme (FP7-SSH). These projects focus on:

1. macro and micro processes in the transition to a knowledge-based economy;
2. institutional and market frameworks relevant to the generation, accumulation and exchange of knowledge;
3. internationalization of Europe’s innovation systems; and
4. key messages for the development of European research policy.

DIME addresses contemporary challenges facing the European Union, its member states, its companies and its citizens in managing the transition to a knowledge-based economy and society in the context of its enlargement and of the globalization of the economy, while GLOBINN analyses three modes of international knowledge sourcing strategies of European firms and their effect on performance.

### **Internationalisation of innovation and its characteristics**

Research undertaken in the two projects identifies multinational enterprises (MNEs) as the main drivers of the internationalisation of innovation in the European Union and beyond. In contrast to their domestic counterparts, MNEs are seeking more opportunities globally and face greater competition from home and abroad, hence they are more motivated to engage in global technology acquisition. However, domestic firms are non-trivial players in this process.

Firms engage in internationalisation of innovation through three modes, namely:

- i. Buying or selling technology from the global technology market, for example, outsourcing R&D or design services from other countries and licensing.
- ii. Collaboration between business and academic sectors.
- iii. Off-shoring own R&D activities by MNEs in their foreign subsidiaries located in other EU countries, US or developing countries.

Outsourcing, via trade or licensing provides firms with a quick way to obtain complex technology. In particular, in recent times in-house R&D has become more and more expensive, time-consuming and risky. However, outsourcing technology by European firms seems not yet to be a popular option. This is suggested by a recent empirical study of a large-scale Italian firm survey in the Lombardy region, one of the leading industrialised regions in Italy. A very small proportion of firms outsource their R&D and design services internationally. But two sectors are an exception: energy and chemistry, and electronics and optics. These sectors have a much higher percentage of firms engaging in such activities.

Potential impediments preventing firms from accessing external technology include the imperfectness in the market for trade in technology, which is an analogue to product market, which can be found in the microeconomics literature. Imperfectness in terms of information flow, international standards and intellectual property rights protection impose significant search costs, accompanied by

huge uncertainty upon firms. Moreover, according to the literature on international technology transfer, firms who successfully acquire external knowledge usually have to undertake a certain level of changes in terms of their own management practice and organisational arrangement. Such changes can be costly to small firms.

The creation of an EU-wide market for technology trade and licensing, and its integration into the global technology market has profound implications for the growth and competitiveness of European firms who have the capability to generate new technology. Firms may not be able to fully exploit economic benefits of the new technologies they create, if they do not have adequate resources to produce intermediate or final products in which these new technologies are embedded. Unfortunately this is the case as European firms are losing their competitiveness in production to their foreign competitors from developing countries. A fully functional technology market enables more European firms to specialise in new technology creation but not the lower level of activities in the value chain. In turn the specialisation will boost European firms and the EU's competitiveness.

Currently trade on the disembodied technologies of EU countries is in deficit compared with US and Japan, which enjoys a surplus of it. Such situation echoes the existing problem that Europe is falling in term of innovation capacity. Given that in Europe a large global market for high technology exists, particularly the software and biotechnology, the European firms in the relevant industries need to enhance their participation in the internationalisation of technology trade.

Collaboration between firms or firm-university links rely on network ties formed among individuals and organizations involved. Such network ties are a multi-dimension phenomenon in that they are concerned with which firm (or university) to collaborate with, what kind of ties to build, the closeness and length of the ties, the frequency of interaction by each partner and the cultural distance between the partners. Such dimensions can be summarised in a depth-time-culture closeness coordinate.

Strong network ties built between firms and firm-university links can provide a social environment and mutual support to partners. Empirically it has been proved that cohesive and strong network ties between international R&D partners can help in forming relational trust so as to facilitate reciprocal information exchange, knowledge sharing and joint learning. It can also increase the competence and expertise in players' technological domain. Especially for firms in their initial stages of growth, utilising network ties is important for them to overcome difficulties of resource scarceness and avoid duplication of innovative efforts. However, research shows that the overall collaboration in innovative activities between firms in the EU-15 is quite low, and on average, large firms are more likely to engage in inter-firm R&D cooperation than smaller firms.

In particular, joint R&D activities through joint-venture, strategic alliance and partnership that are based on strong network ties are popular among firms in high-technology industries. The joint R&D activities embed themselves in an in-

ternationally diversified business environment, market structure and cultural background, thus availing players of broader learning opportunities than those available in a domestic partnership. By exploiting scale economies and resources, expertise in research and marketing in multiple nations, the participating parts will have a higher probability of generating successive large-scale R&D output.

**More and more MNEs conduct R&D activities in their foreign subsidiaries.** By doing so MNEs gain access to a global knowledge base located in a diversified environment and culture. Conducting R&D in a foreign subsidiary is a suitable way for MNE parent to develop innovative products that fit in the local market where the subsidiary is located. Close ties with customers, suppliers, and even competitors generate accurate and quick feedback for the R&D department in the local subsidiary and allow it to update existing products or produce new products because such an information flow is undistorted and should not be overlooked or lost during transmission, if otherwise it has to be sent back to the MNE parent.

**In contrast to collaboration with foreign partners one major advantage of conducting own R&D lies in the ability of an MNE to copy and transport its own operational and managerial structures to a distant location.** The culture and norm of the enterprise are preserved in a foreign subsidiary so as to reduce to the maximum extent the costs due to the conflict between cultures.

**MNEs choose to internalise R&D activities in home and host countries and establish an internal R&D network because it is considered more efficient and effective than market-mediated channels (such as technology trade) to create, distribute and assimilate knowledge.** In addition, intellectual property rights can be better protected in such an internal network. The knowledge flow in this network is two-direction, as flows can go from a parent firm to its foreign subsidiaries, or vice versa. Two key channels identified in the literature of international business for internal information flows are person-based mechanisms, i.e. personnel rotation, and ICT-based written media. Recent studies show that parent firm's innovation capacity can be strengthened via knowledge input from its R&D creating subsidiaries abroad.

**MNEs employ diversified and broader knowledge bases in different countries at the expense of not being able to exploit the economies of scale of scope, since given amount of internal financial resources is spread over multiple locations.** Another caveat of building a global R&D network is that knowledge generated in different locations won't necessarily be translated into valuable innovations. A mechanism of integration and coordination is highly appreciated as a key component in an effective R&D network.

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### **Impact of Internationalisation on Firm Performance**

**An empirical study based on US patent data citation shows that on average, geographic dispersed R&D activities are correlated with an intermediate decrease in the value of a firm's innovation.** The negative effect suggests that the inter-region innovation benefit may be outweighed by the difficulty of managing and integrating knowledge across dispersed R&D units. However, if the ability of achieving inter-region knowledge integration is taken into account, firms that possess this

ability have a greater innovation value than those that do not. The above mentioned knowledge integration can be achieved through inter-regional collaboration and personnel rotation.

The experience of Italian MNEs is that R&D activities conducted in their foreign subsidiaries can boost parent firms' innovation performance by a large margin. The "reverse knowledge transfer" has a larger impact on parent firms if the transfer is via a person-based mechanism, such as team work and managers' transfer, than the impact via ICT and written media. Competence-creating subsidiaries and the subsidiaries that generate knowledge through external relationship with local resources are the contributors to this "reverse knowledge transfer".

In terms of collaboration, strong ties in inter-firm R&D partnership improve the technological performance of firms in high-tech industries through deep and extended cooperation. In this context of specific industries, for example the pharmaceutical and chemical industries, international R&D alliances yield higher innovative returns than domestic alliances.

The achievement of desired innovation performance from internationalisation of innovation is constrained, according to the relevant literature. The following reasons contribute to the underperformance: appropriability, country-specific institutional, legal and technological barriers, sticky nature of technological knowledge, obstacles in cross-country flow of talent, search costs and the differences in norms and cultures.

Various approaches can be taken according to firms' heterogeneous characteristics so as to alleviate or overcome such constraints. Large firms are usually more likely to bypass country-specific barriers by internalising R&D exploration, for example, doing R&D in diversified locations. Acquisition of R&D-intensive firms is also a smart choice if technologies cannot be separated from their managerial structure. Instead small firms will find that collaboration is a more economic and realistic way to access international knowledge resources while incurring lower uncertainty and risks.

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### Key Policy Messages

The fear that deepening internationalisation of all stages of firm's value chain may negatively affect regions in terms of employment and industrial clustering is a myth. European firms' outsourcing activities have a clear and predominant regional dimension. Firms are building tight links with suppliers in the upstream industries locally, and then gradually extend the links to regions located in other European countries. Only a few of them, mostly large multinational enterprises can go as far as to reach distant continents.

The regional dimension of firms' internationalisation means that the EU, as a whole will be the first to enjoy the benefits of more efficient allocation of human and capital resources, the benefits of an optimised market structure through competition, and the benefits of mobilising EU-wide knowledge capacity. In order to promote this "regional" internationalisation, policy makers can consider the instruments that could encourage more domestic firms to join the game. This

follows from the fact that the most active players are multinational enterprises, which increasingly decentralise their value chain, including innovation activities, internationally.

For a long period, government subsidies to small firms to develop their own innovation capacity were seen as an effective policy tool. However, a different approach may also be effective, providing subsidies to small firms in order to facilitate their organisational re-structuring so as to better adapt to technology which can be bought in. This kind of approach is also relevant to the other mode of international technology acquisition – collaboration.

Barriers to the growth in trade of technology need to be eliminated. For example, effectiveness of information exchange, IPR protection and industry-specific (such as high tech sectors) barriers are the major issues to be addressed in moving towards the creation of the EU-wide large market for technology trade and licensing. This market also needs to be well integrated into the global market.

An EU-wide market for technology trade and licensing is crucial to the economic growth and integration of new member countries. This market would provide great opportunities for new member countries to become technology suppliers in some technology niches to the old members, and consequently contribute to their own economic growth. The shift of high value-added activities would be a natural progression after the shift of production and services activities took place. Via horizontal integration (complementary technology) and vertical integration (downstream R&D product) new member countries can be better positioned in the EU knowledge economy.

Co-ordination of the “national systems of innovation” is important. The aim of creating knowledge-based economy in the EU has been embedded in the “national systems of innovation” frameworks. However, the major players of knowledge-based economy – European multinational enterprises, extend their activities across the national borders and they are also facing new competitors from industrialised countries or new emerging economies such as India and China. This new situation calls for better co-ordination at EU level and willing cooperation at national level so as to allow the European countries and firms to respond to new challenges in a more effective way.

The fact of insufficient funding of research in the EU compared to the U.S and Japan seems warrant to rise in such funding as the subsidies allocated under the 7th Framework Programme are expected to contribute to a better industrial exploitation of scientific research. The assumption of the European Research Area (ERA) scheme that an ERA will contribute to a better exploitation of scientific research into technological innovations is justified because regions that draw more on accessible inputs through extensive research collaboration networks are more innovative.

**Further reading**

DIME working papers can be downloaded from <http://www.dime-eu.org/working-papers>

More outputs of GLOBINN project are going to be available from <https://globinn.freeman-centre.ac.uk/>

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**DIME project at a glance**

<b>Title</b>	“Dynamics of Institutions and Markets in Europe”
<b>Objectives</b>	<p>DIME seeks to address and analyze (1) the generation, accumulation, and exchange of knowledge; (2) the governance, institutional frameworks and public policies; and (3) the social and spatial proximity as influencing cohesion and the above. Namely the project aims to the governance of dynamic economic and social systems from the micro to the macro level, specifically involving the study of spatiality in these processes.</p> <p>The project consortium is structured as an open network, consisting both of well established research institutes and researchers, and smaller, more isolated teams, while it provides opportunities for participation by non members, as well as opportunities for new members to enter the network.</p> <p>Its work is centred on three research directions (Research Action Lines - RALs) while three types of activities (Structural Action Lines - SALs) are foreseen:</p> <p>Research Action Lines (RALs):</p> <ol style="list-style-type: none"> <li>Dynamics of individuals and organisational knowledge in a regional context.</li> <li>The creation, accumulation and exchange of knowledge in networks, sectors and regions.</li> <li>Dynamics of knowledge accumulation, competitiveness, regional cohesion and economic policies: a micro-to-macro approach.</li> </ol> <p>Structural Action Lines (SALs):</p> <ol style="list-style-type: none"> <li>Integrating and developing training activities associated with dime.</li> <li>Developing the information structure of dime.</li> <li>Disseminating to and interacting with stakeholders.</li> </ol> <p>DIME is aiming at providing a better understanding of the fragmentation of the knowledge base concerning the industrial development in Europe at the national and regional level. It helps existing research institutes and researchers to enhance their capabilities by creating a necessary critical mass and a relevant cognitive infrastructure.</p> <p>The research output of DIME targets following stakeholders: the general public as a whole, industry, local actors and policy makers.</p>
<b>Duration</b>	1 May 2005 – 30 April 2010
<b>Website</b>	<a href="http://www.dime-eu.org/">http://www.dime-eu.org/</a>
<b>Scientific Co-ordinator</b>	Patrick LLERENA, <a href="mailto:pllerena@cournot.u-strasbg.fr">pllerena@cournot.u-strasbg.fr</a> BETA - Bureau d’Economie Theorique et Appliquee

**Research Consortium****Austria**

- The Vienna Institute for International Economic Studies (WIIW)  
<http://www.wiiv.ac.at>

**Bulgaria**

- Bulgarian Academy of Science (AED)  
<http://www.iki.bas.bg>

**Czech Republic**

- Centre for Economic research and Graduate Education, Economics Institute  
<http://www.cerge-ei.cz>

**Denmark**

- Danish Research Unit for Industrial Dynamics (DRUID)  
<http://www.druid.dk>

**France**

- Analyse des Dynamiques Industrielles et Sociales (ADIS)  
<http://www.adislab.net>
- Bureau d'Economie Théorique et Appliquée (BETA)  
<http://cournot2.u-strasbg.fr/users/beta>
- CEPN-IIDE  
<http://www.univ-paris13.fr/CEPN>
- Centre National de la Recherche Scientifique (CNRS)  
<http://www.cnrs.fr>
- Ecole Polytechnique Paris research team on applied epistemology (CREA)  
<http://www.crea.polytechnique.fr>
- ERMES - Research team on Markets, Employment and Simulation  
<http://www.u-paris2.fr/ermes>
- EconomiX  
<http://economix.u-paris10.fr>
- Institute for law and economics of the firm and industry (GREDEG)  
<http://www.idefi.cnrs.fr>
- Research Group on quantitative economics (GREQAM)  
<http://www.greqam.fr>
- Research Unit in theoretical and applied economics (GREThA)  
<http://beagle.u-bordeaux4.fr/gretha-new>
- Theoretical Analysis of Organisations and Markets (ATOM)  
<http://atom.univ-paris1.fr>

**Germany**

- Fraunhofer Institute for Systems and Innovation Research  
<http://www.isi.fraunhofer.de>
- Gottfried Wilhelm Leibniz Universität Hannover: Institute for Economic and Cultural Geography  
<http://www.wigeo.uni-hannover.de>
- Kiel Institute for World Economics (IfW)  
<http://www.ifw-kiel.de>
- Max Planck Institute for Research into Economic Systems (MPG-MPIEW)  
<http://www.mpiew-jena.mpg.de>
- Philipps-Universität Marburg: Faculty of geography  
<http://www.uni-marburg.de/fb19>

**Greece**

NTUA-LIEE - Laboratory of Industrial and Energy Economics

<http://www-liee.chemeng.ntua.gr>

**Italy**

- Centre of Research on Innovation and Internationalization (CESPRI)

<http://www.cespri.unibocconi.it>

- Laboratorio di Economia dell'Innovazione (LEI)

[http://www.fondazionerosSELLI.it/User.it/index.php?PAGE=Sito\\_it/centri\\_pres&unit\\_id=14](http://www.fondazionerosSELLI.it/User.it/index.php?PAGE=Sito_it/centri_pres&unit_id=14)

- Laboratory of Economics and Management (LEM)

<http://www.lem.sssup.it>

**Norway**

- Centre for Technology, Innovation and Culture (TIK-IPP)

<http://www.tik.uio.no/forskning/Innovation/ipp>

**Portugal**

- DINBMIA: Centro de Estudos Sobre a Mudança Socioeconómica

<http://dinamia.iscte.pt>

**Poland**

- UNIJAG - Department for Regional Development

<http://www.geo.uj.edu.pl/zaklady/zrre>

- Warsaw University, Faculty of Economic Sciences (UWARS)

<http://www.wne.uw.edu.pl>

**Slovakia**

- FEI-STU Bratislava

<http://www.fei.stuba.sk>

**Spain**

- UPF Department of Economic and Business

<http://www.econ.upf.edu>

**Sweden**

- Centre for Research on Innovation and Industrial Dynamics (CIND)

<http://www.cind.uu.se>

- Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE)

<http://www.circle.lu.se>

- IMIT Center on R&D, Innovations and Dynamics of Economies (RIDE)

<http://www.imit.se>

**Switzerland**

- Chair of Economics and Management of Innovation (CEMI)

<http://cemi.epfl.ch>

**The Netherlands**

- Eindhoven Centre for Innovation Studies (Ecis)

<http://www.tm.tue.nl/ecis>

- International Economics & Business (IE&B)

[http://www.eco.rug.nl/ie\\_en\\_b](http://www.eco.rug.nl/ie_en_b)

- Maastricht Economic and social Research and training centre on Innovation and Technology (UNU-MERIT)

<http://www.merit.unu.edu>

- Urban and Regional research centre, Section of Economic Geography (URU)  
<http://researchgroup.geo.uu.nl/index.php?groupid=41>

#### United Kingdom

- Birkbeck College  
<http://www.bbk.ac.uk>
- Brunel Research in Enterprise, Innovation (BRESE)  
<http://www.brunel.ac.uk>
- Centre for Advanced Studies (CASS)  
<http://www.cf.ac.uk/cass>
- Centre of International Business and Innovation (CIBI)  
<http://www.business.mmu.ac.uk/cibi>
- Centre for Knowledge, Innovation, Technology and Enterprise (KITE)  
<http://www.ncl.ac.uk/kite>
- Cohesion and Economic Geography Group (LSE-CEGG)  
<http://www.lse.ac.uk>
- Durham University - Department of Geography  
<http://www.dur.ac.uk/geography>
- Innovation, Knowledge and Development (IKD)  
<http://www.open.ac.uk/ikd>
- Manchester Institute of Innovation Research (MIoIR)  
<http://www.mbs.ac.uk/mioir>
- Queen Mary Department of Geography  
<http://www.geog.qmul.ac.uk>
- Programme on Regional Innovation (PRI)  
<http://www.regionalinnovation.org.uk>
- Science and Technology Policy Research (SPRU)  
<http://www.sussex.ac.uk/spru>

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#### Funding Scheme

Network of Excellence (NoE) under the 6th Framework Programme, Priority 7: "Citizens and Governance in a Knowledge-Based Society" (FP6-CITIZENS)

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#### EU Financial Contribution

€ 4.900.000

**GLOBINN project at a glance**

**Title** "The Changing Nature of Internationalisation of Innovation in Europe: impact on Firms and the Implications for Innovation Policy in the EU"

**Research Objectives**

The overall objective of GLOBINN is to study the internationalisation of innovation amongst European firms and its effect on firm performance. Firms can employ three modes in internationalising their innovative activities:

- i. Global trading of technology based services and licensing.
- ii. International collaborative agreements and strategic alliances.
- iii. International dispersal of their own R&D and technology creating activities.

GLOBINN aims to bring together leading EU scholars involved in studying each of these modes largely in isolation to focus on an integrated analysis. The proposed research has the following overarching aims:

- a) To analyse the prevalence of the three main mechanisms of internationalization of innovation;
- b) To understand the underlying firm level processes and strategies and assessing their impact on performance;
- c) To study the implications of the empirical results in relation to the three main modes of internationalization for both national and EU-level science and technology policies.

GLOBINN will contribute to the European policy by exploring available data to increase the evidence base and provide a sounder basis for discussing the available policy instruments that can be utilised to address the Lisbon strategy in the face of globalisation in innovation activities.

**Duration** 11 May 2008 – 31 October 2010

**Website** <https://globinn.freeman-centre.ac.uk/>

**Scientific Co-ordinator** Parimal PATEL, [parip@sussex.ac.uk](mailto:parip@sussex.ac.uk)  
SPRU, University of Sussex

**Research Consortium**

- Indian Institute of Management, Bangalore (India)  
<http://www.iimb.ernet.in>
- Bocconi University (Italy)  
[http://www.unibocconi.eu/wps/wcm/connect/SitoPubblico\\_EN/Navigation+Tree/Home](http://www.unibocconi.eu/wps/wcm/connect/SitoPubblico_EN/Navigation+Tree/Home)
- UNU-MERIT (The Netherlands)  
<http://www.merit.unu.edu>
- University of Oslo (Norway)  
<http://www.uio.no>
- SPRU, University of Sussex (United Kingdom)  
<http://www.sussex.ac.uk/spru>
- Brunel Business School (United Kingdom)  
<http://www.brunel.ac.uk/about/acad/bbs>

- Office of National Statistics (United Kingdom)  
<http://www.statistics.gov.uk/hub/index.html>

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**Funding Scheme**

Collaborative project (small and medium scale focused research project) under the 7th Framework Programme under the 'Socio-economic sciences and the humanities' theme' (FP7-SSH).

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**EU Financial Contribution**

€ 1.111.983