

Factors in Corporate R&D Location: Where and Why?

*A project proposed by the
Government-University-Industry Research Roundtable (GUIRR)
The National Academies*

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Objective:

The idea that the United States dominates cutting edge science and technology is increasingly challenged as the US share of patents and scientific awards declines and corporations report increasing reliance on offshore research and development (R&D)—either in their own new R&D facilities or collaboration with universities or other companies abroad. Indeed, recent discussions within GUIRR reveal that nearly all GUIRR industrial members are considering locating their next R&D facility or project outside the United States. Somewhat surprisingly, the reasons given were largely related—not to cost—but to the need for scientific expertise located elsewhere and the ease of accessing external expertise in other countries.

Our goal is to provide survey evidence that can serve as the basis for informed policy discussions on these issues. We will survey US and European based companies in order to identify key factors in R&D siting decisions and to develop a framework to evaluate the relative importance of these factors. Such data and analysis are critical for fruitful discussions of policy initiatives to enable the United States to attract and retain the advanced technology sectors that drive job creation, high productivity, and economic growth.

Project Description:

As increasing numbers of countries become technologically capable, the globalization of R&D capabilities is inevitable. The geographical location of industrial R&D investments, either virtual or "bricks and mortar," has a cascading and long-term effect on the economy of the region. Thus, it is not surprising that US policymakers view any loss in the attractiveness of the United States as the location for industrial R&D with some concern. The problem is that available evidence is anecdotal and while agencies such as the Bureau of Economic Analysis (BEA) and the National Science Foundation (NSF) provide aggregate data on R&D expenditure, there is no source of information related to the origins of R&D decisions. For informed policy discussions, it is important to understand the factors affecting these decisions and their relative importance.

The attached table lists nine types of factors that GUIRR members suggested are important in their R&D-siting decisions.

FACTORS	ISSUES
1. Support for Pre-existing Manufacturing Facilities	<ul style="list-style-type: none"> • Technical support to solve manufacturing problems • Product adaptation to local market
2. Proximity to New Markets (Product or Service)	<ul style="list-style-type: none"> • Same types of support as in 1 • Variety of factors in new facilities, including new markets, cheap labor, regulatory environment, etc.
3. Supply of Scientists or Technical Workers in Critical Areas	<ul style="list-style-type: none"> • University expertise in relevant fields located in countries where R&D support is best (e.g. Nuclear engineering, metallurgy (China and Korea), thermodynamics, processing technologies) • Cost of scientific expertise
4. Technology Transfer Landscape	<ul style="list-style-type: none"> • Ownership of intellectual property • Policies and financing for research collaboration • Environment for spin-offs
5. Intellectual Property Protection	<ul style="list-style-type: none"> • Patent enforcement post TRIPS • Differential enforcement across countries
6. Legal & Regulatory Environment	<ul style="list-style-type: none"> • Tort law • Restrictions on research (e.g. stem cell) • Regulatory hurdles (e.g. drugs)
7. Export Requirements	<ul style="list-style-type: none"> • Ability to export tied to establishing local R&D facility <ul style="list-style-type: none"> ○ <i>Quid pro quo</i> for access to local market (e.g. China) ○ <i>Quid pro quo</i> for sale to government (e.g. aerospace)
8. Tax Policies	<ul style="list-style-type: none"> • Tax holiday for new R&D facilities • Differential taxes
9. Infrastructure	<ul style="list-style-type: none"> • Financial • Transportation • Communication

These factors are not listed in any particular order, nor are they exhaustive. The proposed survey will focus first on identifying the importance of these and other factors and second on developing a weighting scheme and framework to guide policy discussions. The need for the latter should be apparent since all of these factors are likely to influence R&D decisions. Moreover, factors have very different policy implications. For example:

- R&D facilities to support manufacturing either to provide technical support for processes or product development may be desirable (contrary to notions from the popular press) particularly in the case of item 2, where both the manufacturing and R&D sites represent market expansion (as opposed to reallocation of production).
- Items 3 and 4 are perhaps the most surprising and troubling if, in fact, they are driving R&D decisions in many industries. As noted in item 3, several members gave examples of areas in the physical sciences where the preeminent expertise is now located outside the United States. Others, particularly representatives of electronics companies, cited increasing difficulties in dealing with US universities as a reason for increased collaboration with universities elsewhere and location of major R&D facilities to facilitate collaboration.
- Since the last round of the WTO, with the extensive revision of trade related intellectual property, and a phase in of patent protection in developing countries, it would not be surprising to find that an increased ability to protect intellectual property developed outside the United States is an important factor. Moreover, such a response would be the desired response to improvements in the multilateral policy environment.
- Items 5-8 represent other policies, most of which are examples of discriminatory policies that may be troublesome. For example, research restrictions on stem cell research will likely influence not only current, but also future R&D, as it may affect the future supply of scientists in this area.

It is anticipated that the factors relevant to basic research location may be different than those for applied research or development, and that the factorial weights may also differ depending on industry sector. Finally, the survey and subsequent analysis will need to consider current R&D decisions compared with historical outsourcing of R&D (as many companies located research facilities offshore in the 1960s and 70s). One of the important results of the study will be a better understanding of whether the movement towards greater R&D outsourcing in the last decade or two has been "incremental" or whether it is "accelerating" in intensity.

Survey Design and Analysis:

The survey design and analysis will be contracted to Emory University and the Georgia Institute of Technology, with Jerry Thursby and Marie Thursby, professors of economics and strategic management, respectively, as principal investigators. The project

is envisioned as a 2 year project with the first year devoted primarily to survey design and administration, as well as preparation of an interim report of results. The second year will be devoted to statistical and policy analysis.

As part of the survey design process, individual CTO's/CEO's and key executives responsible for relocation decisions will be asked to preview the questions to ensure they are unambiguous to the intended survey respondents and can elicit a meaningful response (cognitive testing). The survey will be developed as a telephone instrument to achieve optimal response rate and maximize accuracy of the data. Current plans are each phone interview to last approximately 30 minutes and to be professionally coded for efficient data collection and analysis. Firm identity will be kept strictly confidential by the investigators.

Respondents will be recruited from the Industrial Research Institute (IRI), whose members comprise over 240 R&D performing companies in the U.S. and abroad. IRI's Board has approved involvement in the project and Ross Armbricht, IRI President, has held preliminary discussions with leadership of the European Industrial Research Management Association (EIRMA), with over 100 members, regarding participation by European companies. Direct involvement in this initiative by the leadership of IRI and EIRMA will help ensure high survey response rates, as will peer pressure from the GUIRR corporate membership, many of whom are also members of IRI.

Survey data will be augmented with data from the Census Survey of Industrial Research and Development in order to allow econometric analysis which controls for various firm characteristics (e.g., firm size, research "intensity", etc.) in analysis of responses. A portion of these data are confidential and application to the BEA for access will be made. As we noted, any presentation of results will be done in such a manner as to protect confidentiality of the respondents.

Funding Requirements

Georgia Tech and Emory have agreed to forego all but 10% overhead. Excluding publication costs and any charges from IRI, the budget estimate for Georgia Tech and Emory participation is \$312,624. Funds will also be needed for GUIRR to cover publication and dissemination of results. An interim report at the end of the first year, suitable for publication will be provided.

	Year 1	Year 2
Travel	20000	2000
Summer*		
Jerry Thursby 2 Months/Yr	51352	52893
Marie Thursby 1 Month/Yr	27777	28610
Course release	39572	
Survey	35000	
Research		
Assistants and		
Programmers	15000	10000
Supplies	1000	1000
SubTotal	189701	94503
Overhead at		
10%	18970	9450
Total By Year	208671	103953
Grand Total		312,624

* Includes Salary and Fringes

The Importance of Foundations as the Funding Source

In discussions with Congressional staff and the Commerce Dept., it is apparent that the information to be obtained from this survey is critical to informing decisions currently being made by Congress and a number of federal agencies. We continue to receive calls from individuals who have heard secondhand about this project, even though it has not yet even been launched. One reason for the high level of interest is that the information is *so* sensitive that agents of the U.S. government find they cannot obtain it. To obtain direct data from the industries themselves, it is absolutely essential for the industry survey respondents to be assured of impartiality and confidentiality. Though government agencies can promise (and often deliver) confidentiality, they are also bound by the Freedom of Information Act and Shelby Amendment provisions. The specter of public release of the raw data looms large in the survey respondents' minds. For this reason, the organizations driving the study must be impartial, well-respected, and non-governmental. It is for this reason that we are soliciting funds from foundations rather than the government. We have also segmented the involvement of government entities in the project so they do not have access to the data or findings until they are published as an

open report. Management of the study by an impartial and well-respected non-governmental organization (such as the National Academies) should also reassure survey respondents that their inputs will be kept in strictest confidence and not used for political purposes.

GUIRR

GUIRR, the Government-University-Industry Research Roundtable, is a unit of the non-profit, non-governmental National Academies. The objective of GUIRR is to improve the research enterprise of the U.S. through discussion among leadership of the three sectors (government, university, and industry) and individual projects designed to inform or change policy. A list of the GUIRR membership is appended.

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