

**Testimony of**

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**To**

**The Committee on Small Business  
United States House of Representatives**

**On**

**Global Outsourcing of Engineering Jobs:  
Recent Trends and Possible Implications**

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## **1. Introductory Remarks**

Let me begin by thanking Chairman Manzullo and other distinguished Members of the House Committee on Small Business for inviting IEEE-USA to testify on the subject of the global outsourcing of white-collar jobs – an increasingly controversial issue with serious implications for individual Americans and the future economic and technological competitiveness of the United States.

My name is Ron Hira and I am a Post Doctoral Fellow at Columbia University's Center for Science, Policy and Outcomes in Washington, D.C. I am testifying here on behalf of the more than 235,000 U.S. members of the Institute of Electrical and Electronics Engineers. I chair IEEE-USA's Research and Development Policy Committee and am an active member of its Career and Workforce Policy Committee.

The Institute of Electrical and Electronics Engineers is a transnational technical and professional society made up of more than 382,000 individual members in 150 countries. The IEEE's primary purposes are to advance the theory and practice of electrical, electronics, computer and software engineering; improve the careers of our members and increase their ability to innovate and create wealth for the benefit of the societies in which they live and work. IEEE-USA was established in 1973 – in the midst of an earlier economic downturn – to promote the professional careers and technology policy interests of IEEE's U.S. members.

Nearly 70% of IEEE-USA's members work for private businesses, primarily in the aerospace and defense, bio-medical technology, computers and communications, electrical and electronics equipment manufacturing and electric power industries. Approximately 1/3 of our industry members work for firms with 500 or fewer employees. Ten percent of our members work for Federal, state and local governments. Another ten percent teach at American schools of engineering or work at non-profit research organizations. Most of the rest are self-employed and work as consultants to businesses and government.

## **2. Global Outsourcing - Recent Trends and Future Projections**

Pete Engardio and his colleagues at Business Week have assembled a comprehensive and very compelling description of the global outsourcing phenomenon. The graphics, statistical tables and sidebars in their February 3, 2003 article entitled "Is Your Job Next" explain related trends and their implications for white collar workers, including U.S. engineers and scientists, in startling detail.

The article provides an alarming picture of the kinds and numbers of white-collar jobs that major American companies are shifting to overseas locations, mostly in developing economies in the Far East, Latin America and Eastern Europe. The article also makes it very clear that the most important economic and strategic driver behind global outsourcing is the ready availability of substantial numbers of skilled professionals in other countries who are willing and able to work for much less than their counterparts in the United States.

The following tables describe global outsourcing of white collar jobs in more detail. To illustrate the trend, the first table identifies several major U.S. based employers who are currently outsourcing important scientific and engineering work to lower cost, offshore locations.

**Table 1 – Major U.S. Exporters of Science and Engineering Jobs**

<u>Company</u>	<u>Numbers of Workers and Country</u>	<u>Types of Work</u>
Accenture	5,000 to the Philippines by 2004	Accounting and software
General Electric	20,000 to India and China in 2003	Aircraft and Medical R&D
Intel	3,000 to India by 2006	Chip design, tech support
Microsoft	500 to India and China in 2003	Software design, IT support
Oracle	4,000 in India	Software design and support
Phillips	700 in China	Consumer electronics R&D

Source: *Business Week*

The second table compares recent increases in the numbers of natural science and engineering degrees awarded in countries to which white-collar jobs are being outsourced with similar statistics for the United States.

**Table 2 - Science and Engineering Degree Production in Selected Countries**

<u>Country</u>	<u>BA and BS Degrees</u>		<u>MA, MS and PhD Degrees</u>	
	<u>1989</u>	<u>1999</u>	<u>1989</u>	<u>1999</u>
China	127,000	322,000	19,000	41,000
India	165,000	251,000	64,000	63,000
Philippines	40,000	66,000	255	937
Mexico	32,000	57,000	340	63,000
United States	196,000	220,000	61,000	77,000

Source: National Science Foundation

The third table describes the cost of engineering talent in the United States and four other countries based on the concept of purchasing power parity.

**Table 3 – Annual Salary Requirements for an Engineer in Selected Countries**

<u>Country</u>	<u>Purchasing Power Parity</u>	<u>Annual Salary</u>
United States	1.0	\$70,000
Hungary	0.367	\$25,690
China	0.216	\$15,120
Russia	0.206	\$14,420
India	0.194	\$13,580

Source - Ron Hira, Columbia University

The fourth table includes estimates of the numbers and kinds of white-collar jobs likely to be outsourced in the years immediately ahead.

**Table 4 – Projected Numbers of US Jobs to be Moved Offshore\***

<u>Profession</u>	<u>By 2005</u>	<u>By 2010</u>	<u>By 2015</u>
Architecture	32,000	83,000	184,000
Business Operations	61,000	162,000	348,000
Computer Science	109,000	277,000	473,000
Law	14,000	35,000	75,000
Life Sciences	3,700	14,000	37,000
Management	37,000	118,000	288,000

\* To low wage countries such as China, India, Mexico and the Philippines

Source – Forrester Research Inc.

### **3. Global Outsourcing of Jobs Exacerbates U.S. Engineering Unemployment**

Unemployment among America’s engineers has spiked sharply upward from 2.0% in 2001 to 4.2% in 2002 to more than 6.0% in the first quarter of 2003.

The unemployment problem is even worse for all electrical, electronics, computer and software engineers. According to the Bureau of Labor Statistics at the U.S. Department of Labor, unemployment among electrical and electronics engineers reached 7.0% in the first quarter of 2003. 6.5% of all computer hardware engineers and 7.5% of computer software engineers were also unemployed during the same period. These are *unprecedented* levels for each occupation.

IEEE-USA is concerned that these increases in engineering unemployment may not be a short term, cyclical phenomenon that will correct itself when the economy begins its long anticipated upturn. Instead, current engineering unemployment is the result of much more fundamental structural changes in the U.S. economy that could have very serious, long-term affects – not only on the future viability of engineering as a high-wage/high value added career – but on the nation’s economic and technological competitiveness and the continuing ability of small businesses to be a major driver of innovation and job creation in the United States.

The current economic and employment problems we face are complex and interrelated. There are no easy answers or silver bullets in terms of public policy recommendations. But we do think that the continuing movement of manufacturing facilities and blue-collar jobs, and the growing willingness of major employers to move essential service functions and white collar jobs of all kinds to lower cost, offshore locations is a major contributing factor to our current unemployment crisis.

#### **4. Global Outsourcing Has Economic, Technological and Security Implications**

Traditionally, the United States has been a leader in technological innovation – a major contributor to improvements in productivity, economic growth and personal well-being that took place during the 1990's. Engineers and scientists at colleges and universities, at businesses of all sizes and at public and private research organizations have long been prime movers in the conversion of scientific discoveries into useful products and services and in technological innovation. A nation's ability to innovate is at the core of its economic and technological strength. Location matters when it comes to the innovation process because it generates enormous local spillover benefits and feeds on itself. An obvious example is Silicon Valley.

Global outsourcing of high wage/high value added engineering jobs threatens this leadership on a number of fronts.

- The movement of more and more manufacturing and related service functions to offshore locations means that many technological improvements in manufacturing processes that are discovered and perfected as goods are produced will be developed in other countries.
- The outsourcing of information technology applications development and delivery outside of the United States will reduce opportunities for continuing domestic innovations in software, data communications and data security applications.
- The downward pressure on job opportunities, wages and working conditions that will occur as more and more scientific and engineering jobs are shifted to lower cost offshore locations is likely to reduce the willingness of America's best and brightest young people to pursue careers in science and engineering.
- Personal economic and national security will be subject to increasing risk as responsibility for more and more private, proprietary and mission critical military and national security data is transferred to other countries.

#### **5. Global Outsourcing Has Costs As Well As Benefits**

Global outsourcing is often justified as absolutely critical to the preservation and enhancement of corporate viability and the quality of life in the United States in an increasingly competitive, technology-driven global economy. While there are benefits to global outsourcing, proponents often fail to address the related costs. There are serious, long-term consequences for many Americans, their communities and the nation as a whole. Such adverse consequences may include:

- Loss of employment and income for more and more American professional workers if outsourcing continues to exert downward pressure on job opportunities, wages and other forms of compensation.

- Loss of payroll and income taxes at the national, state and local levels at a time when demands on pay as you go social insurance programs, such as Social Security and Medicare, and the need for improvements in our communications, educational, health care and transportation infrastructures are beginning to accelerate.
- Loss of employer contributions to government sponsored unemployment insurance and workmen's compensation programs that will be needed to help sustain the increasing numbers of displaced workers whose jobs have been moved offshore.
- Loss of national economic and technological competitiveness and increasing dependence on foreign sources of supply for consumer products, military hardware and defense systems as well as the technical talent needed to design, produce and maintain them.
- Further imbalances in international trade and the US balance of payments as America is forced to buy more products and outsourced services than its sells to its major trading partners.

## **6. Public Policy Alternatives**

As I said at the outset of my testimony, the causes of current economic and related employment problems are complex and appropriate policy options for addressing them will require some creativity. We do know that offshore outsourcing is accelerating and policymakers can mitigate some of its negative impacts.

Before we can deal effectively with complex economic problems, we must first learn more about their causes and effects. Reliable statistical information about the current magnitude of global outsourcing and its effects on national and international labor markets is sorely lacking. One policy recommendation, therefore, is to pool the resources of interested parties – educators, employers, government agencies, labor unions and professional societies – to identify the kinds and possible sources of statistical information needed to “get our arms around” the global outsourcing phenomenon.

The current non-immigrant system that brings in temporary foreign workers with H-1B (specialty occupations) and L-1 (intra-company transfers) visas has *accelerated* movement of work offshore as temporary workers in management positions outsource work to overseas colleagues, and as temporary workers who have returned home use their knowledge and connections in the U.S. market to competitively bid for outsourced work. A policy shift away from reliance on guest workers and towards permanent immigration would help minimize this problem.

Increasing reliance on high tech temporary workers has had other negative impacts apart from increased unemployment. Charges of abuse and exploitation of temporary workers are on the rise. Similarly, there are frequent reports of displaced American engineers and IT workers being forced to train their L-1 visa replacements as a condition of their severance package. The H-1B and L-1 visa programs should be reformed to limit these abuses and bring the programs back in line with Congress' original intent. Much engineering and information technology work needs to be done onsite in the U.S., and American workers should have preference over foreign guest workers.

Additionally, Congress should monitor current World Trade Organization (WTO) General Agreement on Trade in Services' (GATS) mode 4, movement of natural persons, negotiations. Many countries have pushed the U.S. to make it even easier to misuse the H-1B and L-1 visas.

Another possible policy option is to identify appropriate tax and other financial incentives needed to encourage employers to create and retain more high wage/high value added manufacturing and service sector jobs by establishing and maintaining more high end research, design, development and manufacturing facilities in the United States.

Current offshore outsourcing has affected U.S. workers more than larger U.S. companies, so another appropriate policy response is to provide assistance to employed, underemployed and dislocated workers in the form of tax incentives to help pay for lifelong learning (continuing education and training), including tax credits for employers that offer training or retraining in high demand technical, management and marketing skills; tax-favored savings accounts to help pay for job and career-related education and training expenses incurred by individual taxpayers; and possibly even relocation accounts to help workers move from low growth to high growth labor markets.

And finally, related to national security considerations, Congress may wish to increase enforcement of "deemed export laws" to reduce the likelihood that mission critical and other sensitive technologies will be transferred overseas through global outsourcing of scientific and engineering jobs.