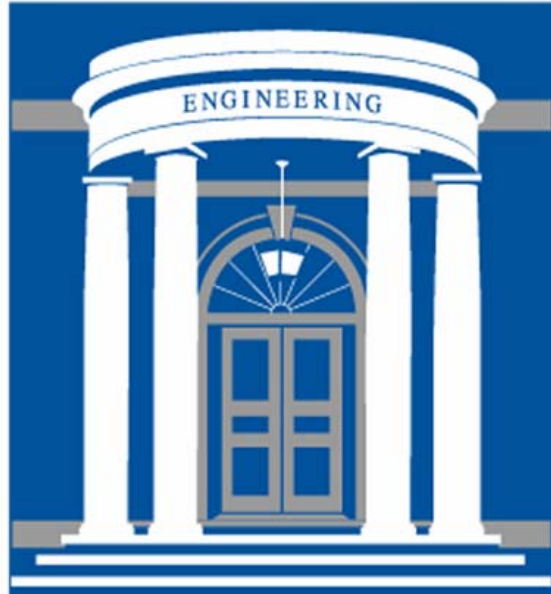


# DUKE



EDMUND T. PRATT, JR.

SCHOOL OF  
ENGINEERING

## Industry Trends in Engineering Offshoring

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## Surprises in Academia

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- In the academic world, there is no such thing as “part-time”
- Students from a top engineering school had doubts about opportunities in engineering
- 30-40% of Duke Masters of Engineering Management students were accepting jobs outside of the engineering profession



## Where are the “facts”?

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- *“Last year China’s schools graduated more than 600,000 engineers and India’s schools produced 350,000, compared with 70,000 in America”*
  - The U.S. Department of Education
- *In engineering, China’s graduates will number over 600,000, India’s 350,000, America’s only about 70,000”*
  - Fortune Magazine



## Wrong facts, wrong conclusions

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- *“All those university graduates in China and India threaten U.S. living standards...”*
  - Fortune Magazine

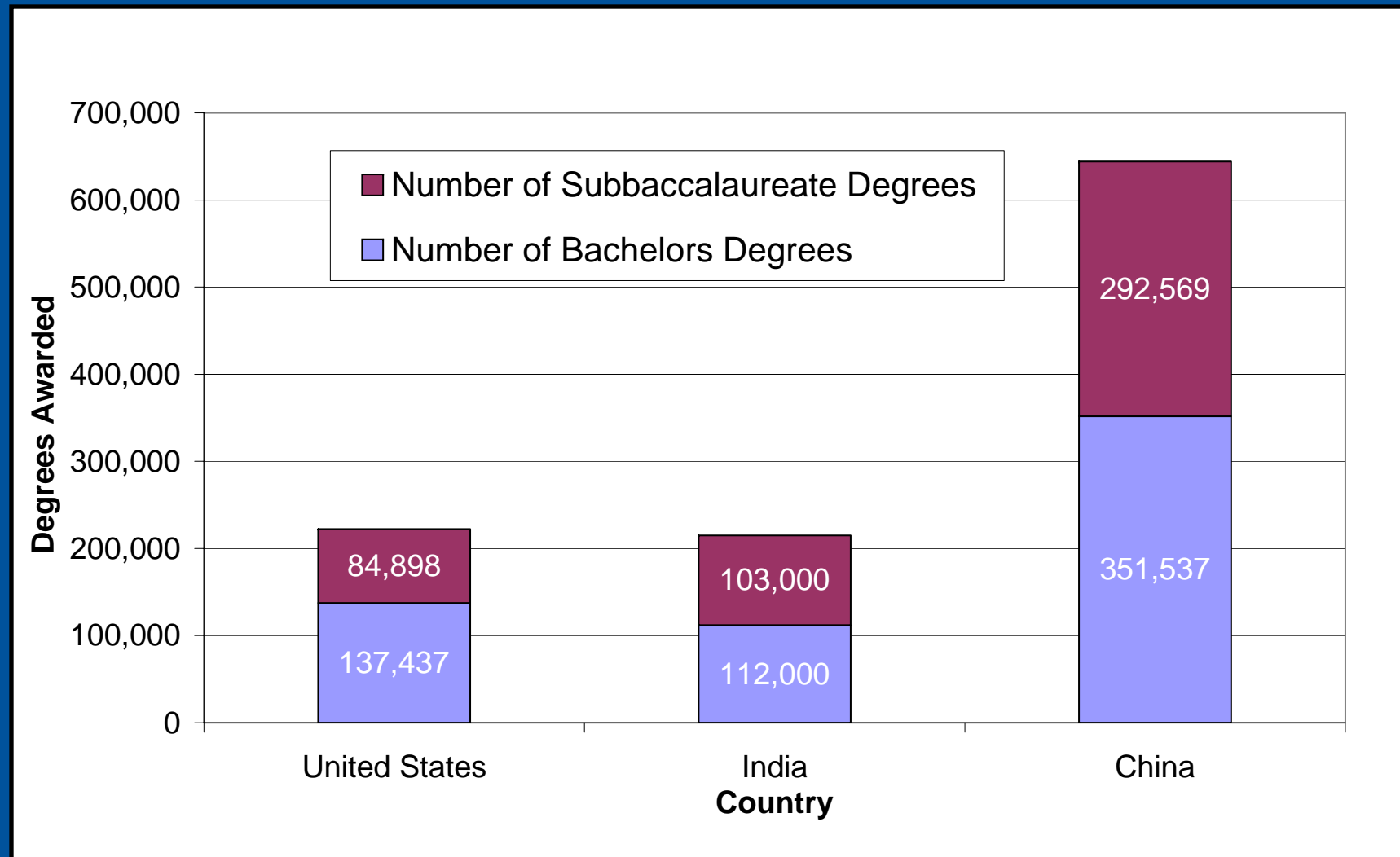


## An Invalid Comparison

<b>Country</b>	<b>Reported Graduates</b>	<b>What is Included in these Numbers:</b>
The United States	70,000	Four-year engineering bachelors degrees.
China	600,000	Three- and four-year engineering degrees under a broad definition of "engineer". Additionally, computer science and information technology three- and four-year degrees are included.
India	350,000	Three- and four-year engineering, computer science and information technology degrees.



# Engineering, Computer Science and Information Technology Degrees Awarded in 2004





# Offshoring Survey

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- Detailed questionnaire/interviews with presidents, division heads, managers and senior HR representatives
- Initial list based on Lou Dobbs companies “Exporting America” – “that are either sending American jobs overseas, or choosing to employ cheap overseas labor, instead of American workers”
- Report summarizes data collected from 78 divisions at 58 U.S. based companies involved in engineering offshoring



## Select Responses– Hiring Experiences

- Many companies hire engineers with 2-3 year degrees/diplomas
  - 40% -- “yes” , 17% -- “depends on additional training experience”
- Most companies have job offer “acceptance rates” of >40%
  - 21% -- acceptance rates of 80-100%, 26% -- 60-79% acceptance rates
- 80% said acceptance rates had stayed constant or increased
- Most companies don’t offer sign up bonuses
  - 44% -- no bonuses, 44% bonuses offered to < 20% of offers
- Engineering jobs get filled in less than 4 months
  - 44% -- 0-2 months to fill an open position, 36% -- 3-4 months



# Changing Nature of the Engineering Workforce

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- Changes in skills over past 3-5 years:
  - better technology, communication and team skills, broader global outlook. 18% say no change
- Additional training desired:
  - better communication/presentation skills, internships, computer related skills, project management, leadership, business skills
- Advantages of US engineers:
  - Understand market, culture, business, communication, interpersonal skills, creativity, problem solving, risk taking, networking, analytical, can work on high security applications, proximity



# Engineering Offshoring

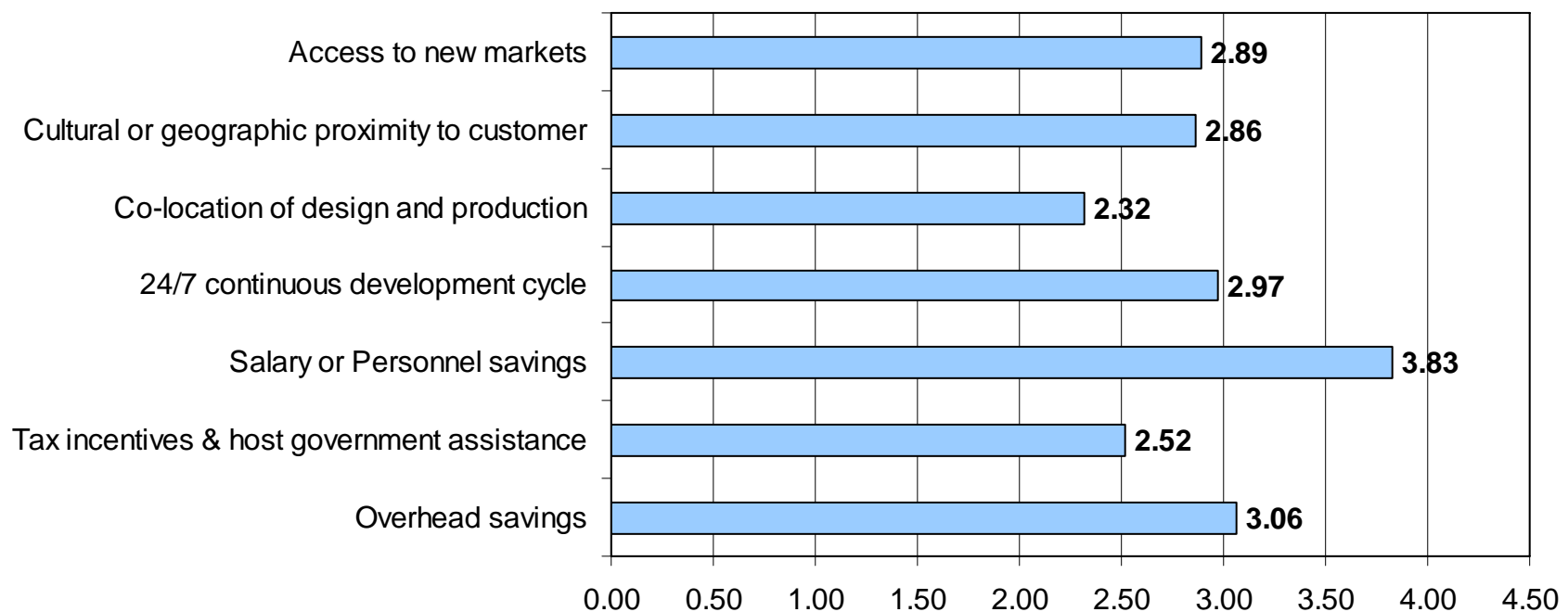
- Top Destinations – India, China and Mexico
- Wide variety of jobs are being offshored including analysis, design, development, testing, maintenance and support
- 44% -- U.S. engineering jobs more technical. 1% -- offshore engineering jobs more technical. 33% -- jobs equivalent
- 37% -- U.S. engineering employees more productive, 24% --equivalent productivity, 9% say overseas more productive
- 38% -- U.S. engineering employees produce higher quality work, 40% -- equal, 1% -- offshore engineering employees higher quality



# Business Advantage in offshoring

In your offshoring endeavors, how much of an advantage, if any, has your company gained from the following?

(1: No Advantage; 5: Significant Advantage)





# Comparisons of the U.S., Chinese and Indian Engineering Workforce

- 75% -- India has adequate to large supply of well-qualified entry-level engineers. 59% -- U.S, 54% -- China
- Weaknesses:
  - US: Salary demands, supply, industry experience, unwillingness to relocate, poor work ethics
  - China: Communication skills, visa restrictions, proximity, experience, loyalty, cultural differences, IP theft, limited “big picture” mindset
  - India: Communication skills, industry knowledge, proximity/visa restrictions, project management, turnover, cultural differences



# Comparisons of the U.S., Chinese and Indian Engineering Workforce

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- Strengths:
  - U.S.: Communication skills, understanding of U.S. industry, superior business acumen, strong education/training, and a sense of creativity and desire to challenge the status quo
  - China: **Cost**, work ethics, willingness to work long hours
  - India: **Cost**, technical knowledge, English, education/training, ability to learn quickly, work ethics



# The Future of Engineering Offshoring

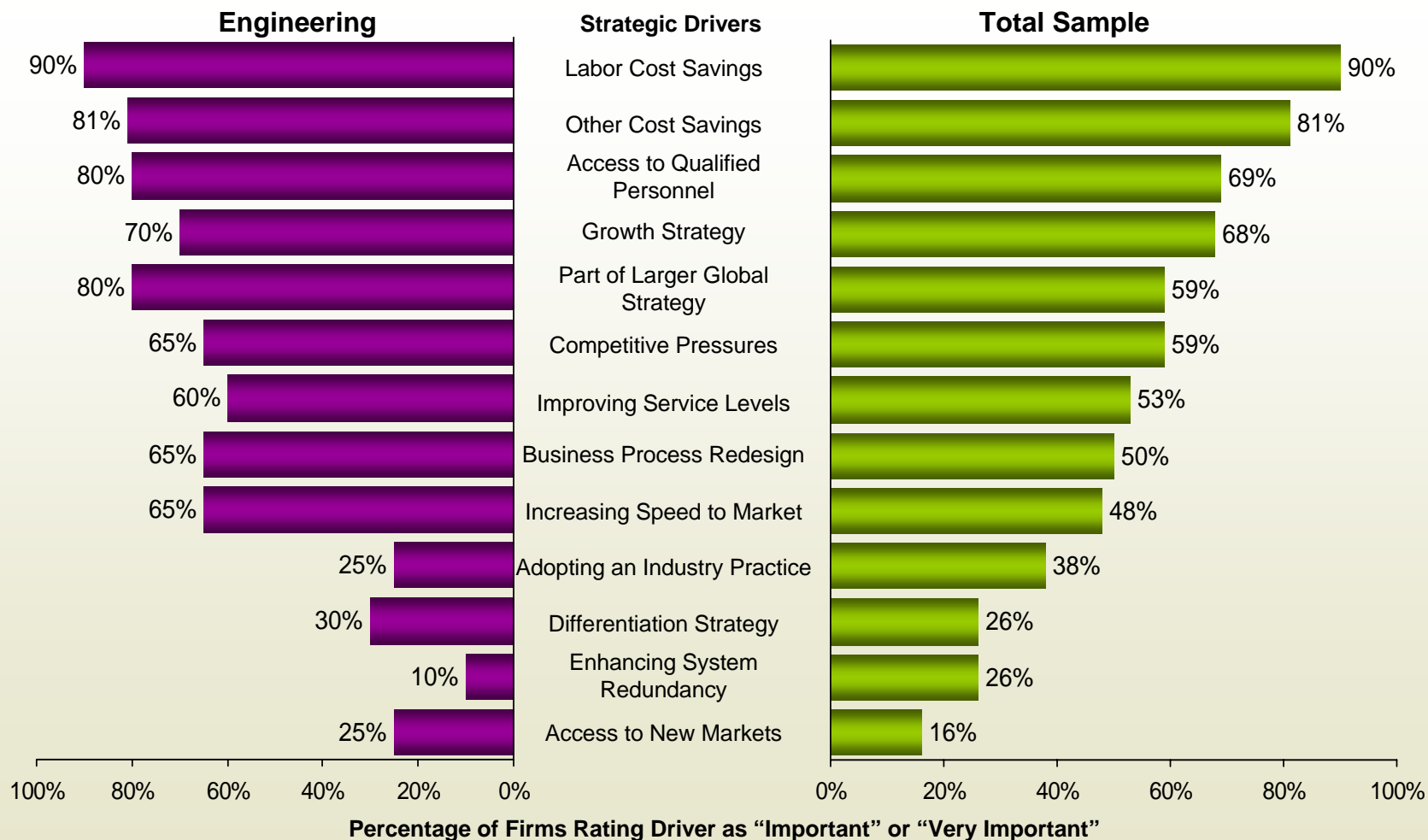
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- Most companies expect trend to continue and expand. Only 5% said expect stabilization or reduction in offshoring
- What won't be offshored?
  - Research, conceptual design , IP work, deep technical, communication or business support, customer interactions, project management, marketing, finance, architect level design, network design, management staff, business analysis, jobs requiring U.S. security clearances
- Barriers – Infrastructure, inflation, IP, technical, culture, language



# Fuqua/CIBER/Booz Allen Hamilton study -- Primary drivers for offshoring engineering

## Offshoring Drivers: Engineering vs. Total Sample



Source: Duke University Offshoring Research Network 2006 Survey