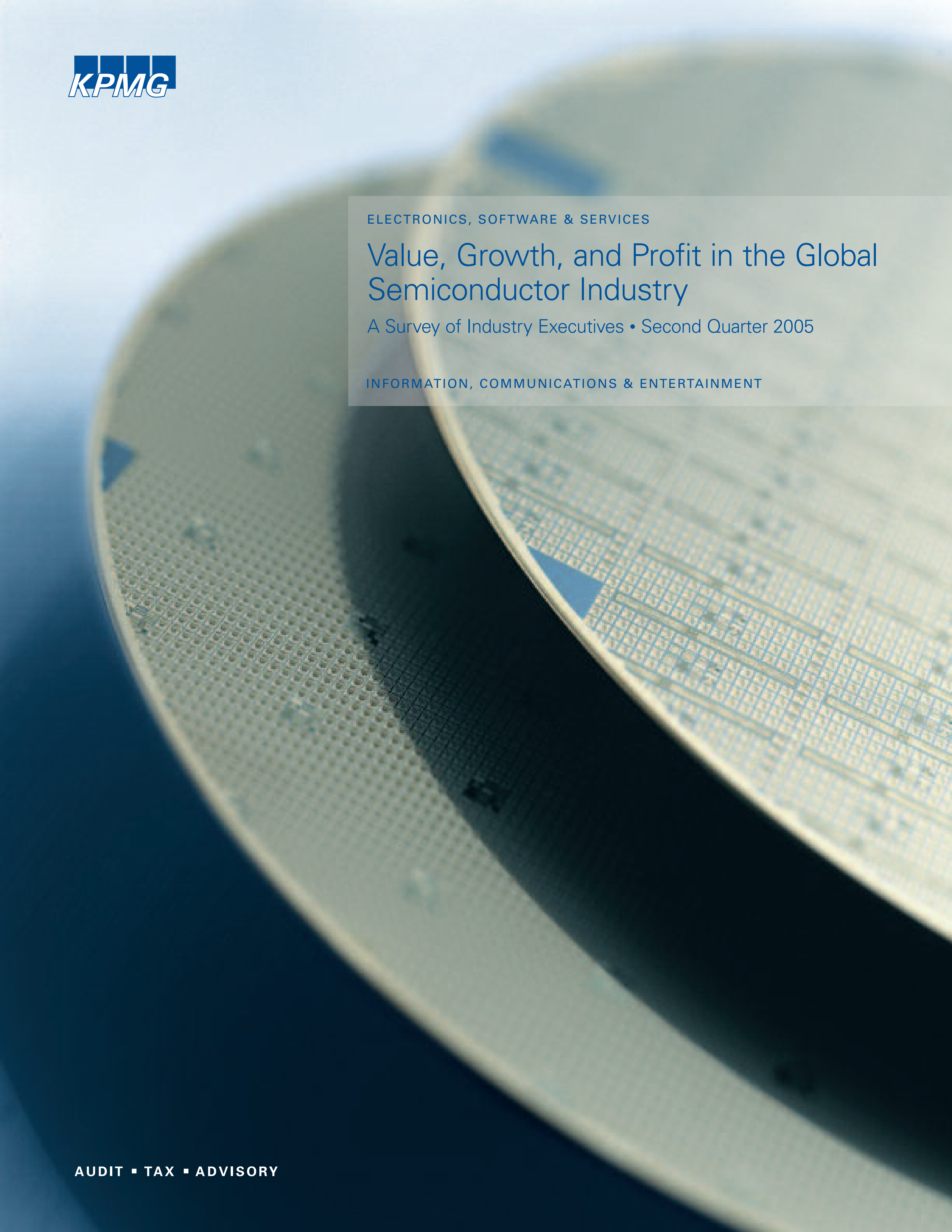

KPMG

ELECTRONICS, SOFTWARE & SERVICES

Value, Growth, and Profit in the Global Semiconductor Industry

A Survey of Industry Executives • Second Quarter 2005

INFORMATION, COMMUNICATIONS & ENTERTAINMENT

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Executive Summary

The semiconductor industry has reached a watershed moment. Electronics manufacturers seeking to reduce production costs are accelerating their migration of operations to countries such as China and India, so chipmakers are reexamining how and where to do business. At the same time, they are redefining business strategies to compensate for a variety of difficult economic pressures, including the increasing costs of developing new technology and adding new manufacturing capacity.

In efforts to preserve a long-established business model based on "Moore's Law" (the cornerstone of the industry's impressive productivity for nearly 40 years) companies are struggling with higher research and development (R&D) costs associated with the growing need to fit an ever-increasing number of transistors into a given area of silicon real estate. They also face a maturing industry with slowing rates of growth, increasing pressure on selling prices, and skyrocketing costs for building semiconductor fabs. Furthermore, the customer base is continuing to shift from traditional industrial applications to consumer-oriented applications.

Confronted with these fundamental challenges, the industry is now looking at next-generation materials and nanotechnology as ways to continue advancing technology —and continuing to serve as a critical enabler for a host of other industries. Many of the industry's leading companies are investing heavily in China and increasing operations in the region in efforts to capitalize on growth opportunities in the region.

These are some of the key findings of a new global survey of industry executives conducted by KPMG LLP (KPMG) in cooperation with the Semiconductor Industry Association (SIA).

Clearly, the semiconductor industry is transforming from a relatively young, high-growth industry to a more mature one—facing many of the same issues other established industries have faced as their markets became more saturated and geographical patterns of supply and demand shifted. But despite some warning signs, executives are confident that the industry can maintain its solid performance based on a proven ability to adapt to rapid change. Though it probably will not match the double-digit compound average growth rise it achieved in the past, due partially to the fact that the industry's baseline revenue is much higher today than when it was growing by about 17 percent annually.

As evidenced by these dynamics and the recent spate of M&A activity, profitability seems to have edged out growth as the key short-term goal across the industry.

Survey Highlights

The KPMG/SIA survey polled more than 48 executives from 32 companies worldwide. The 32 companies include the top 10 global leaders as well as 20 of the top 25 companies as measured by 2004 revenue. Sixty-eight percent of those surveyed were C-level executives (CEO, CFO, CMO, and CTO) and 26 percent were vice president or general manager level. Seventy-three percent represented integrated device manufacturers, 19 percent foundries, and 8 percent "fabless" (companies that do not manufacture their own devices). Fifty-six percent of respondents were from North America, 17 percent from Europe, and 27 percent from the Asia Pacific region.

R&D Investment May Be Inadequate

The survey revealed that basic research represents only 11 percent of the industry's R&D budget during a period when U.S. government funding for researching new technologies is at an inflation-adjusted low compared with the past few decades. This suggests that the development of replacement technologies for complementary metal-oxide semiconductor (CMOS) (the physical foundation on which Moore's Law is based) may not be a near-term focal point for many companies. Yet, when asked whether they would be willing to participate in a consortium to develop nanoelectronics as a replacement, **58 percent of respondents globally said they would participate.** In fact, the semiconductor industry's contribution to exceptional improvements in global economic productivity could be in peril unless suitable replacements for CMOS are discovered and developed before 2020, the widely predicted point in time when CMOS scaling will hit a barrier.

United States Challenged by Far East

Although the United States has long been recognized as the center of the semiconductor industry, it is clear, based on the survey results, that the U.S. leadership position may be at risk, as **the customer base for semiconductors continues shifting to China and the Far East.** Similarly, R&D and capital expenditures are moving eastward.

When asked about the top three changes that will affect the industry in the next three years, executives cited the "geographic shift of the customer base," "slowing industry revenue growth," and "geographic shift of plants and workforces" as their primary focus.

Executives in every region identified China as the top location for growth in capital spending, R&D, and recruiting—largely because that's where their customers are relocating their own operations. Twenty-four percent of survey respondents cited the "geographic shift of the customer base" as the number-one change affecting the industry over the next three years.

When asked to rank the geographic areas that are likely to drive revenue growth during the next three years, China was identified by 24 percent of executives. The rest of the Asia Pacific region was identified by 43 percent, while 16 percent chose the United States, and Europe followed with just 11 percent.

The survey also revealed that executives expect to increase R&D spending in China over the next three years by at least 50 percent and capital spending there by 32 percent.

Consumer Applications Growing

According to the survey and SIA research, "consumer" is gaining in importance as a key stand-alone application category that is expected to drive industry growth over the next three years. Survey respondents ranked "consumer" a close second to wireless communications (both today and in three years) when asked what application markets they expected to be the industry's most important growth drivers. Wireless communications is, as an example, principally a consumer-driven marketplace. This is a stark departure from earlier views of traditional integrated circuit (IC) customer classifications when original equipment manufacturers (OEMs) and their applications (including computing, traditional wire line communications, and automotive) were viewed as the key customer categories.

Despite this growing significance, most respondents indicated that they plan to continue relying on traditional strategies for serving OEM customers—rather than strategies focused on better serving ultimate consumers of their products.

When asked to identify the single attribute of their companies' value proposition that customers see as most important, the majority cited "technology leadership," "delivery," and "cost" considerations—issues traditionally emphasized by industries serving industrial customers. Only three respondents identified an attribute that was consumer oriented, though it appears that more consumer-oriented applications are beginning to drive growth in certain segments of the industry.

Critical Skill Sets Changing

The survey also examined three important semiconductor industry workforce dynamics: technical skill growth, recruiting, and outsourcing.

Executives reported that "analog hardware design" is expected to surpass "digital hardware design" to become the most important critical industry skill set during the next three years. "Software design" and "package design" will grow most quickly in critical importance, while "digital hardware design" and "manufacturing process R&D" are expected to decline most quickly on the critical skill index. Because analog, software, and package design skills generally require on-the-job experience, KPMG suggests that companies review their retention practices—as well as R&D budget planning for experienced hires—in the coming period.

In terms of recruiting, **28 percent of respondents identified China as the key region for recruiting people with critical skills,** with the United States second at 25 percent. Semiconductor executives differ in their recruiting strategies however, based on their headquarters region. Europeans are placing the most emphasis on India, followed by China, the rest of Asia (ROA), and Europe. North American executives are focusing their critical skills recruiting efforts in the United States, China, and India. Asian companies report that they will likely continue to recruit heavily in China, ROA, and the United States.

Outsourcing: A Growing Trend

Considering the high cost of building a new manufacturing facility, hiring capable talent, and investing in in-house R&D, the semiconductor industry relies heavily on outsourcing. **Approximately 24 percent of respondents said they outsource some operations functions.** With regard to critical skills needs, 18 percent said they outsource software design, 13 percent outsource digital design, and 11 percent outsource package design—all functions that were once closely guarded in this highly competitive industry.

Conclusion

Few markets have experienced the rapid growth that the semiconductor market experienced during its relatively short history. However, the industry is now subject to the same kinds of economic, geographical, and technological hurdles that have tested many other industries—challenges that are having a significant effect on companies' business strategies and bottom-line profitability.

Considering the dramatic changes—which are driven primarily by globalization and continued need for technological advancement—semiconductor industry executives remain upbeat about the future as they make the strategic adjustments necessary to remain competitive over the long term. The following KPMG/SIA survey results* provide detailed insights into some of the most challenging issues the industry faces today—and will likely face in the coming decade.

* Totals may not equal 100 percent due to rounding.

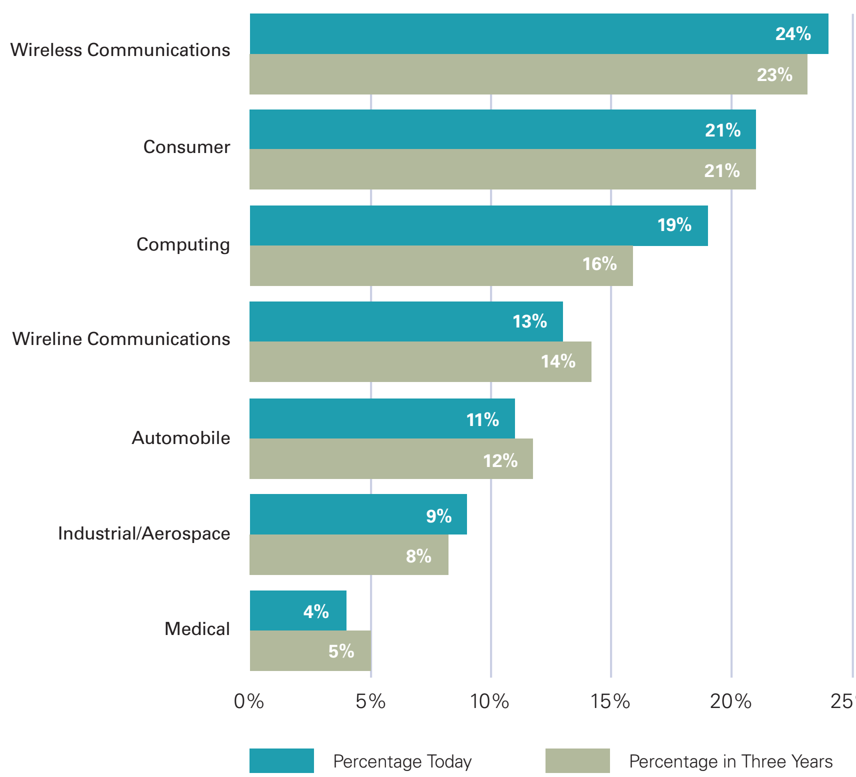
Survey Results

Question 1: Please rank in importance to your revenue growth today the following application markets from most to least important.

Question 2: Please rank in importance to your revenue growth in the next three years the following application markets from most to least important.

Semiconductor industry executives ranked "wireless communications" and "consumer" as the top two application markets driving revenue growth in the integrated circuit industry during the next three years. Computing, long seen as the primary application market, is now ranked number three. Wireline communication is expected to experience a small upsurge as the fourth key application market. The top four applications are estimated to show stable consumption, representing 76 percent today, then easing a bit to 75 percent of industry revenue growth within three years. The importance of computing as an application for consuming ICs is expected to decline from 19 percent to 16 percent. Medical applications are considered least important overall, but are expected to see absolute revenue growth of more than 35 percent (as a source of industry revenue) during the next three years.

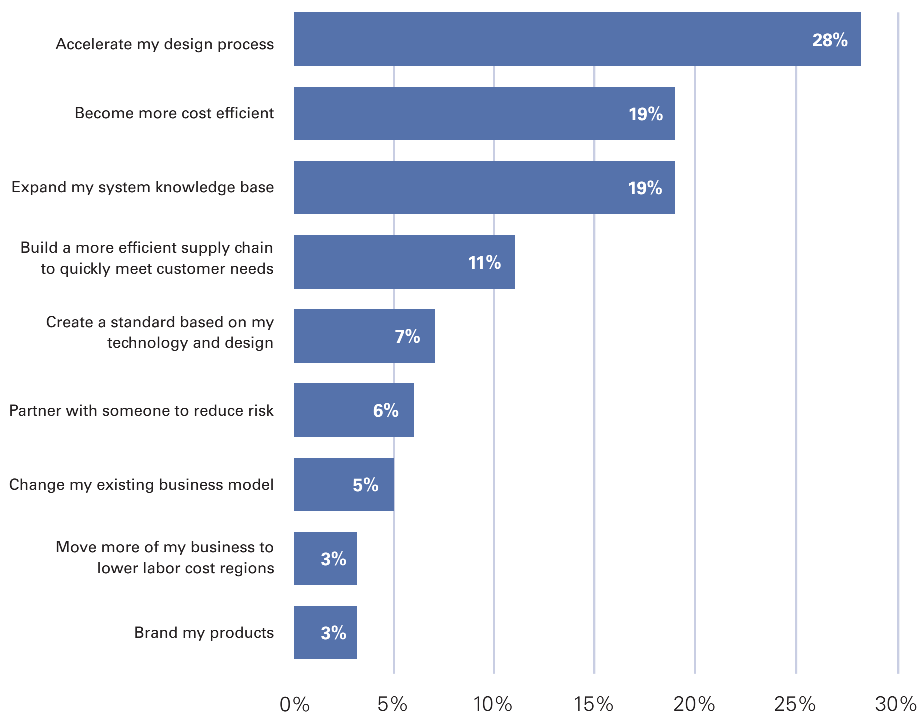
Contribution to Industry Revenue Growth



Question 3: Please rank in order of importance the top three things you will need to do in the next three years to better serve your application markets.

Time-to-market remains an ongoing concern for the semiconductor industry. Executives surveyed indicated that during the next three years traditional strategies will remain the key to improving service to their markets. The most important single strategy by far was "accelerate my design process." Tied for second place were "expand my system knowledge base" and "become more cost efficient."

Top Strategies to Better Serve Customers in the Next Three Years



Question 4: Please rank in order of importance the geographic areas that you expect to drive the greatest absolute revenue growth for your company in three years' time.

Question 5: Please rank in order of importance the top three challenges you anticipate in serving the number-one ranked geographic market selected in the previous question.

China was ranked as the number-one geographic area for driving absolute revenue growth during the next three years. The rest of Asia (including Korea, Singapore, Malaysia, etc.) edged out the United States for second place, with the United States in third place and Taiwan a close fourth. Since China, ROA, and Taiwan hold three of the top four revenue-driver positions, it is clear that executives believe Asia is viewed as the primary market for future revenue growth. Europe and Japan, once powerful revenue-driving regions, are taking a backseat to China and ROA.

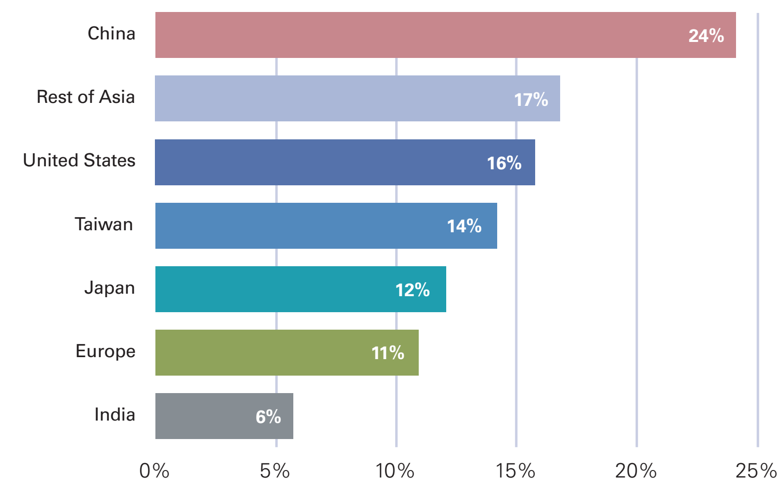
Executives surveyed said "competition" is the number-one challenge they will face in China. Concern over "IP [intellectual property] protection" ranked second, followed closely by "government regulations" and "cost of production." "Access to capital" was not considered a significant challenge for doing business in China.

When asked to identify the governmental regulation that most severely affects their business, or may affect it in the future, the majority of executives cited a number of China-related issues, including:

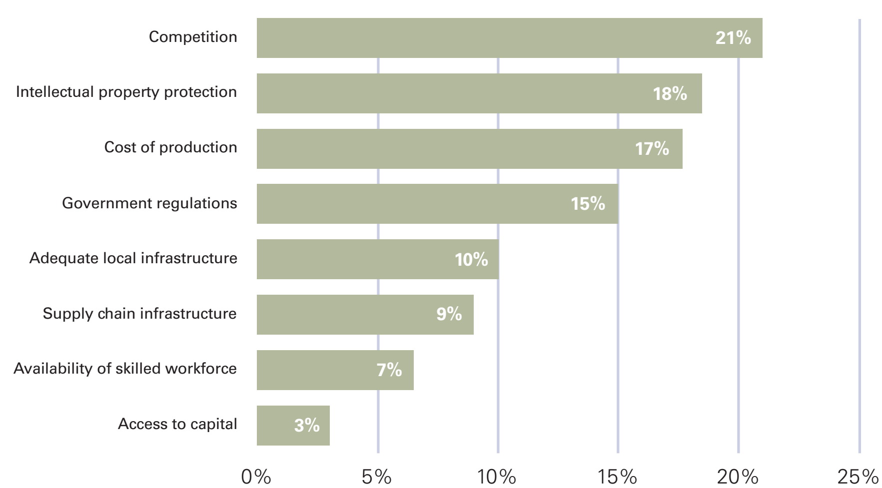
- Intellectual property licensing and protection
- Import/export
- Law enforcement
- Capital investment regulations
- Tax law
- Complicated government infrastructure
- Proprietary standards (protectionist policies)

This broad range of issues is probably due to varying levels of experience among the respondents in doing business in China.

Areas Expected to Drive the Greatest Absolute Revenue Growth



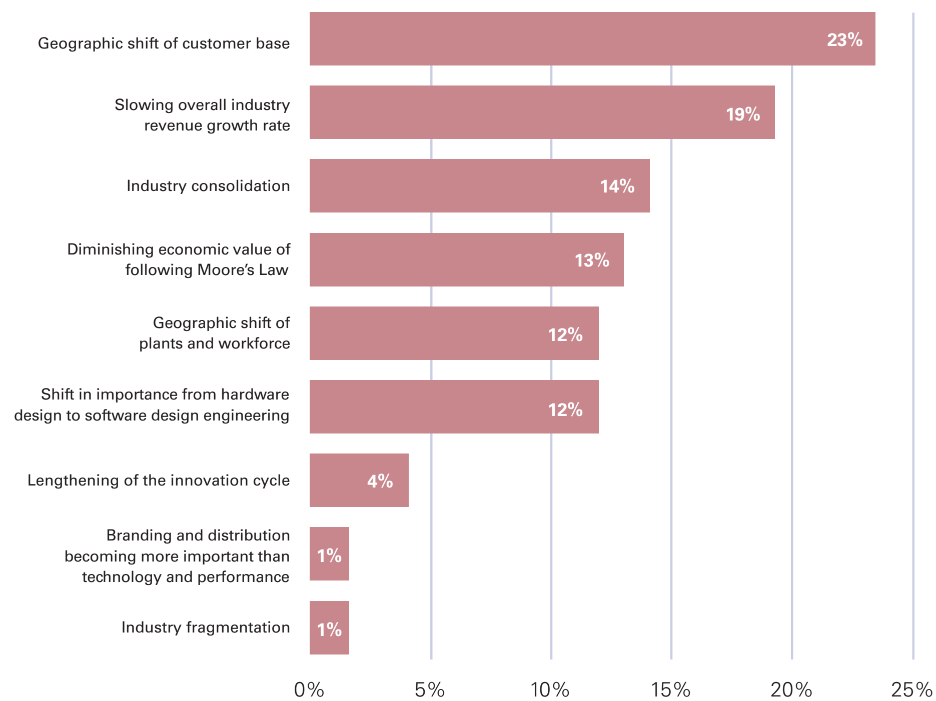
The Top Three Challenges You Anticipate in Serving the Number-One Geographic Market



Question 6: In your view, what are the top three changes that will significantly affect the semiconductor industry in the next three years?

In addressing structural change in their industry, executives for integrated device manufacturers (IDMs) and fabless firms ranked "geographic shift of customer base" as the number-one change that will impact the industry over the next three years. IDMs ranked "geographic shift of plants and workforce" as the second most significant change. Fabless executives identified "industry consolidation" as their second biggest concern. Foundries ranked "diminishing economic value of following Moore's Law" and "slowing overall industry revenue growth rate" as the first and second most significant changes for that subsector, respectively.

Most Significant Industry Changes in the Next Three Years

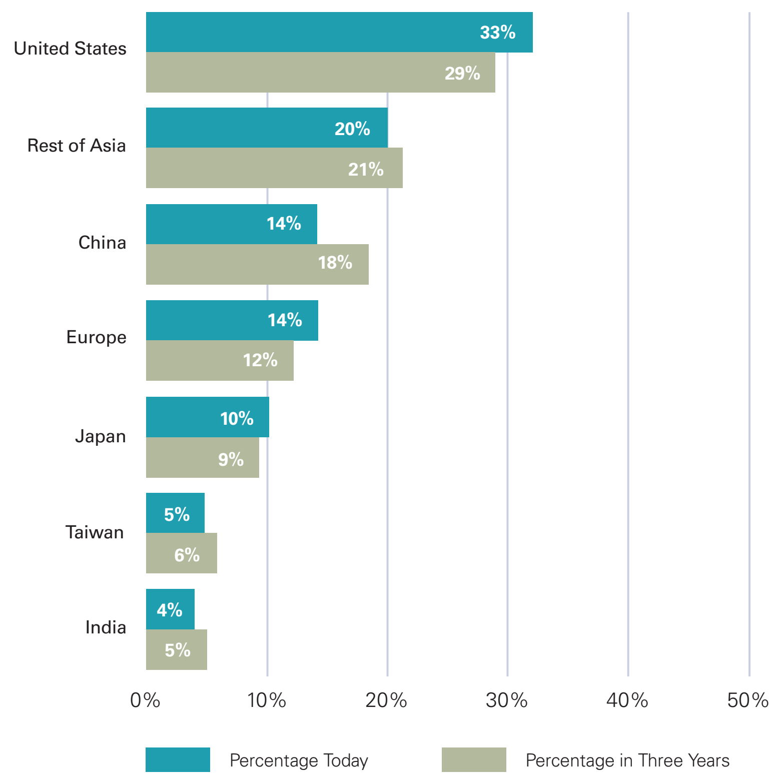


Question 7: Approximately what percentage of your capital expenditure (CapEx) will be allocated to the various regions in which you do business now?

Question 8: Given your previous answer, approximately what percentage of your CapEx budget will be allocated to various regions in three years?

The United States is expected to remain the largest recipient of capital expenditure spending by the industry over the next three years. Executives, however, predict a 12 percent cutback in investment in the United States during the same period. Reductions in investment are also expected in Japan and Europe, while China will enjoy a 32 percent increase in CapEx from IDMs and fabless companies during the period. Though investment in India is relatively low, it also is expected to see a double-digit percentage increase in investment during the next three years.

Percent CapEx Allocation by Region

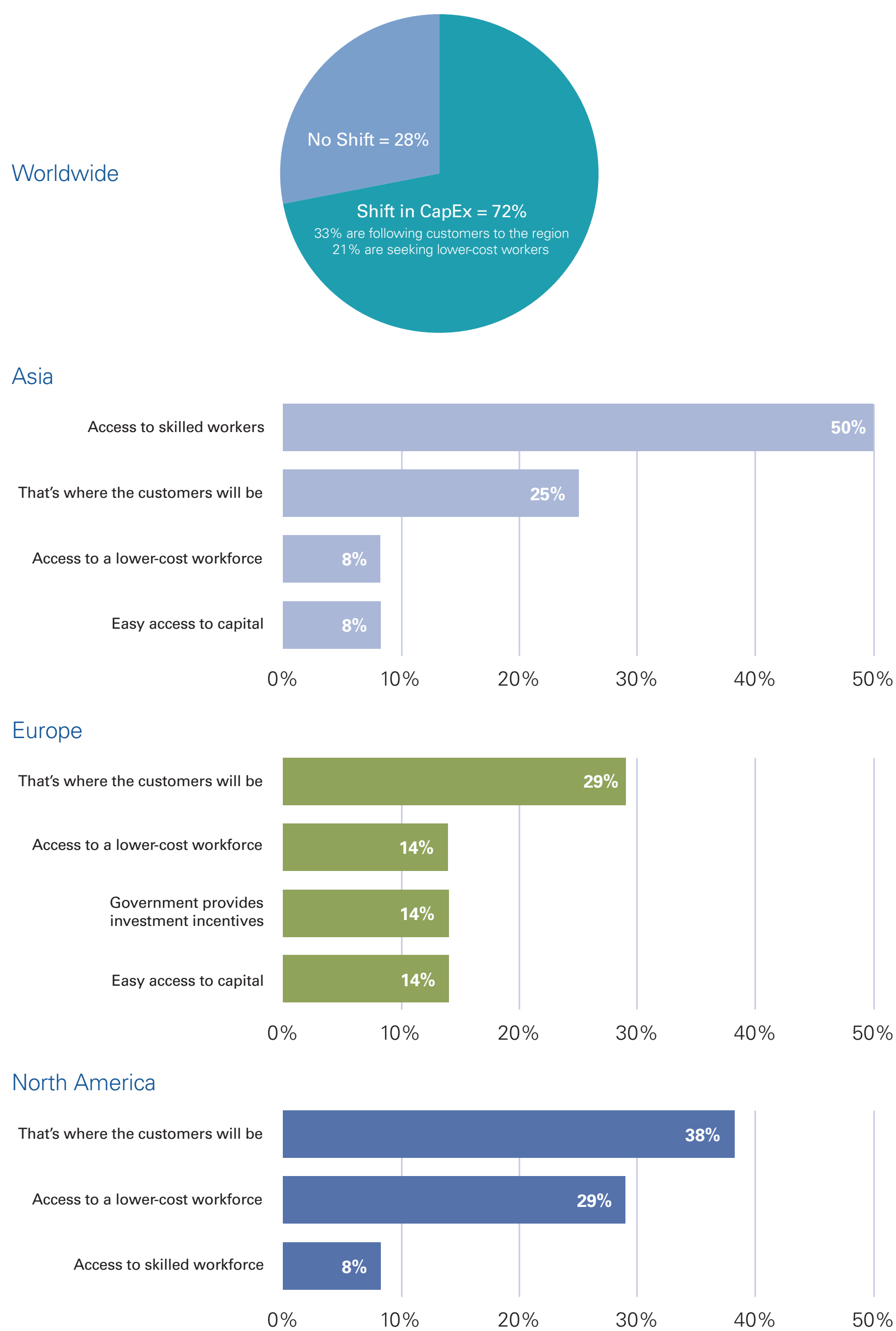


Question 9: If you foresee a shift in CapEx in the next three years, what will be responsible for this shift?

When asked to rank the main causes for the geographic shift in CapEx allocation to China, European and North American executives emphasized: “That’s where the customers will be!” For Asian executives the key driver was “access to skilled workers.” Notably, “access to a lower-cost workforce” was ranked higher by North American respondents than by those from other regions. As a primary motivator on a global scale, however, “lower-cost workforce” ranked in the middle of the pack.

As secondary motivators, European companies appear to be seeking lower-cost workers and lucrative government incentives, while Asian respondents are concentrating spending in Asia due to the proliferation of customers in the region.

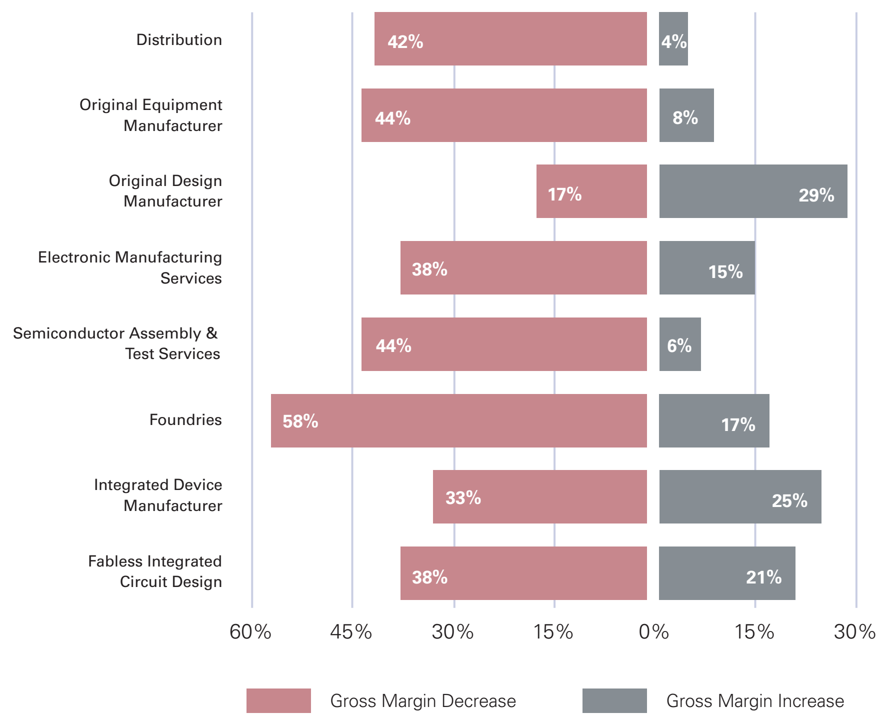
What Will Be Responsible for the Shift in CapEx by Region?



Question 10: Considering the various semiconductor supply chain stakeholders listed below, do you think their gross margins will increase, decrease, or remain unchanged over the next three years?

This confidence index clearly indicates that industry executives are negative to neutral regarding industry margins during the next three years. Executives believe that during the period ODMs are most likely to increase margins, while foundries are expected to earn the lowest margins.

Percentage of Respondents Predicting Gross Margin Change by Subsegment in the Next Three Years



Question 11: Please rank the top three critical workforce skills required today for your company's success.

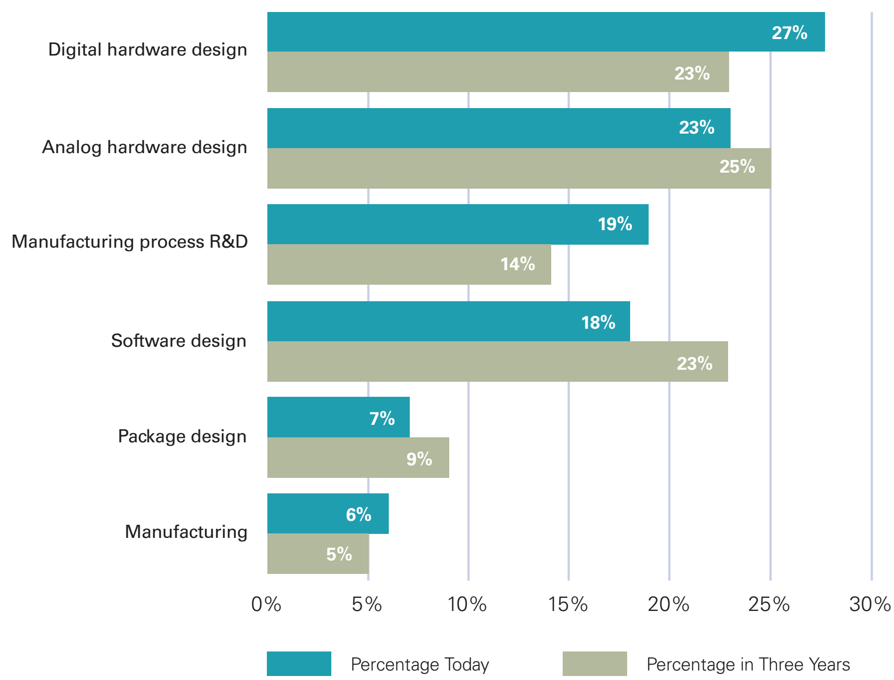
Question 12: Please rank the top three critical workforce skills required for your company's success three years from now.

On a global basis, executives surveyed believe that analog hardware design will be the most important skill set in three years. However, software design will grow the fastest during that period. Looking at the results by region, software design will be the most important skill set for European companies and second most important for Asian and North American companies.

Package design skills are also predicted to grow in importance in both Europe and Asia. Executives from European companies project a decrease in the need for analog and digital designers—which is opposite to the view of North American executives.

Looking at the data by "type of company," it's clear that IDMs see software design as the most critical workforce skill in three years. Fabless companies also see software design and analog hardware design as critical workforce skills. Foundries consider analog hardware design as the critical workforce skill.

Most Critical Industry Workforce Skills

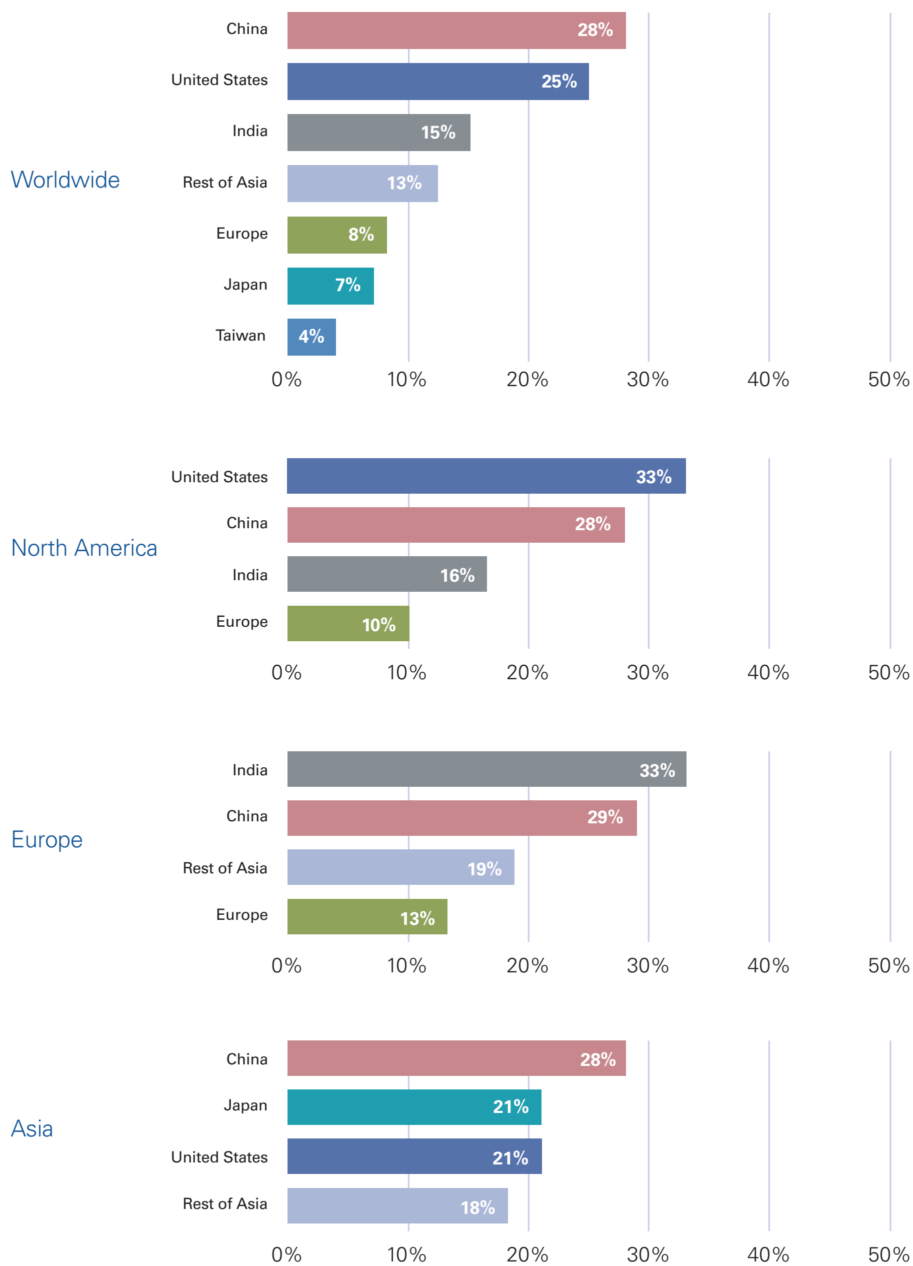


Question 13: Looking out three years, please rank the top three regions from which you will recruit the critical skills you need.

When asked to rank the top three regions from which they would be recruiting critical skills in three years, semiconductor executives' responses reflected a divergence in strategy—confirming the industry's move to the east.

- Europeans are placing their biggest emphasis on recruiting in India, with China, ROA, and Europe as numbers two, three, and four, respectively.
- North American executives expect to focus critical skills recruiting in the United States, China, and India, in that order.
- Companies in Asia expect to recruit heavily in China, Japan, ROA, and the United States.

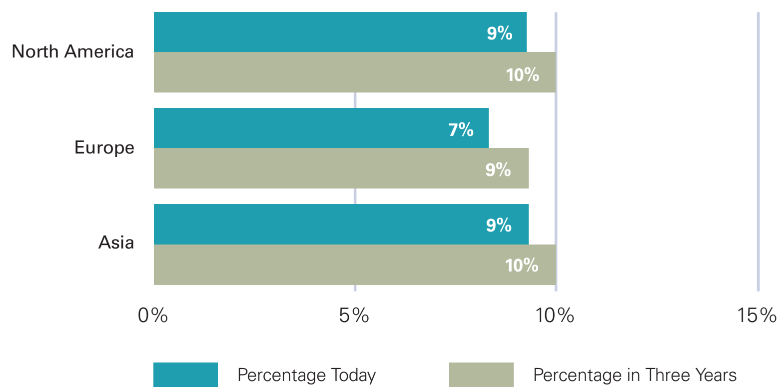
Percentage of Top Regions to Recruit Critical Talent



Question 14: What approximate percentage of your U.S. workforce are contract employees today and what percentage of your workforce do you expect to be contract employees three years from now?

Across the board, the industry expects contract workers to constitute approximately 10 percent of their total workforce by 2008, with U.S. executives expecting to increase the number of contract workers in North America by about 10 percent over current levels during the next three years.

Percentage of Workforce That Are Contract Employees



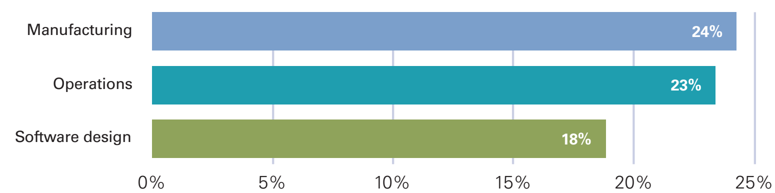
Question 15: Please rank in order of importance the top three workforce skills that you outsource today.

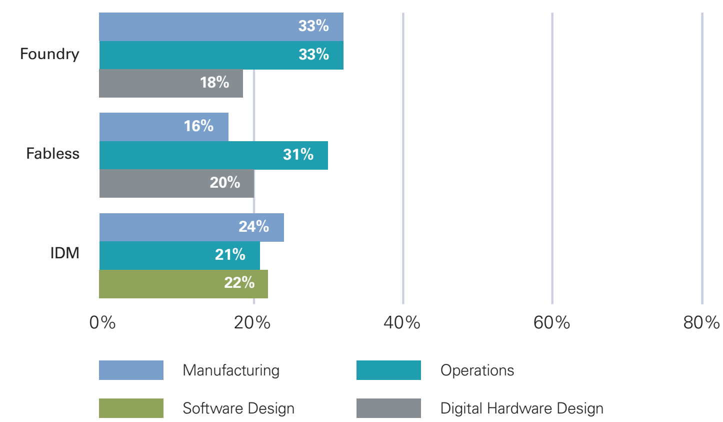
Question 16: Approximately what percentage of your manufacturing do you expect to be outsourced in three years?

According to respondents, operations and manufacturing are the leading areas of job outsourcing in the industry workforce today. However, software design, a workforce skill that is growing in criticality, was ranked third overall.

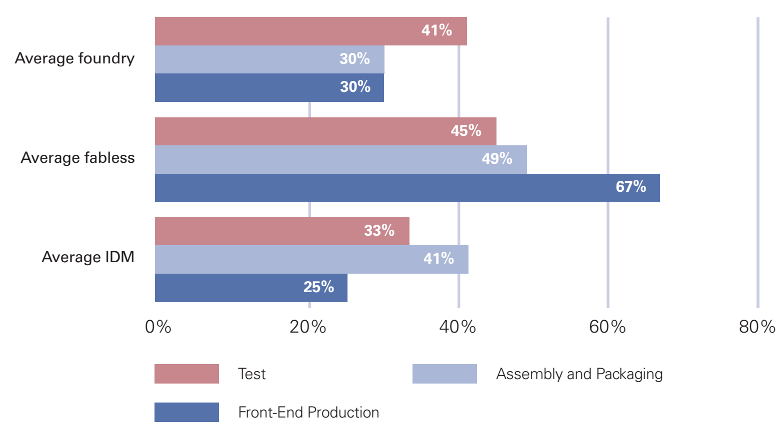
When queried about future outsourcing for manufacturing subspecialties of test, assembly and packaging, and front-end skills, responses followed business-sector lines. Foundries plan to outsource assembly and packaging, and fabless companies plan to outsource everything that is not "core," and look outside for more than 67 percent of front-end integrated circuit production. IDMs, which generally ascribe to an "integrated" business model, appear to maintain a strategic complement of all skills, thus maintaining the traditional IDM outsourcing profile.

Percentage of Workforce Skills Outsourced Today





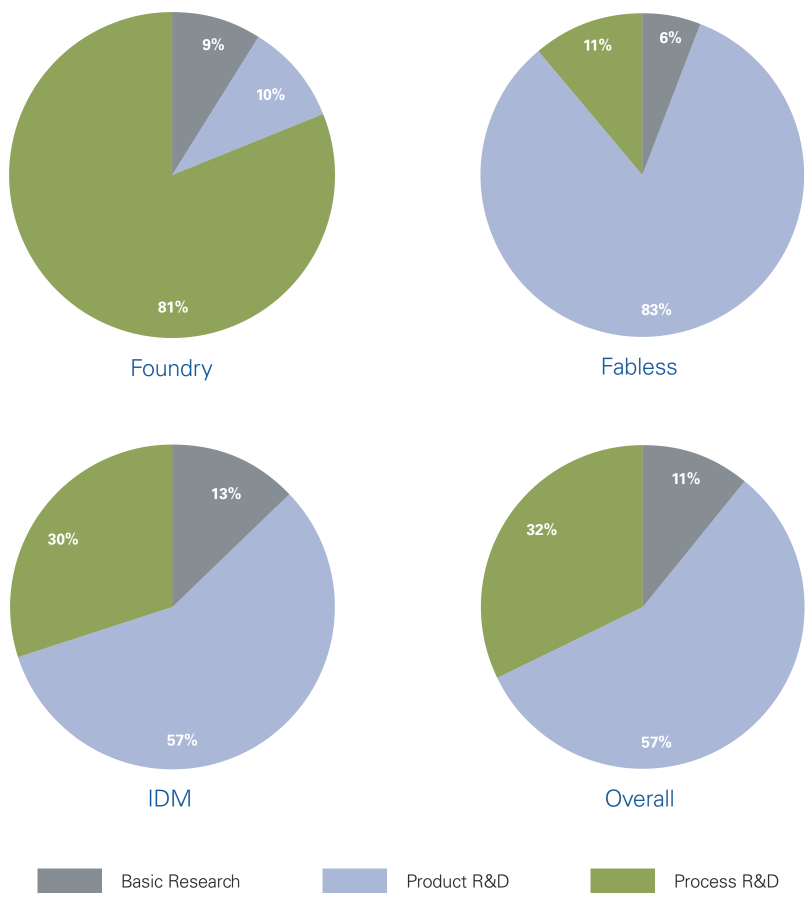
Percentage of Manufacturing Skills Outsourced in the Next Three Years



Question 17: What percentage of your R&D budget is going into the following areas?

The overall response for allocation of R&D budget indicated approximately 57 percent is expected to be dedicated to product, 32 percent to process, and 11 percent to basic research. Projected R&D budget allocations again follow traditional business-sector lines. Foundries plan to invest 81 percent in process R&D and less then 10 percent in basic research. Fabless companies will put more than 80 percent of R&D budgets into product and 6 percent into basic research. IDMs, the largest aggregate-revenue category, expect to invest the largest percentage, 13 percent, in basic research.

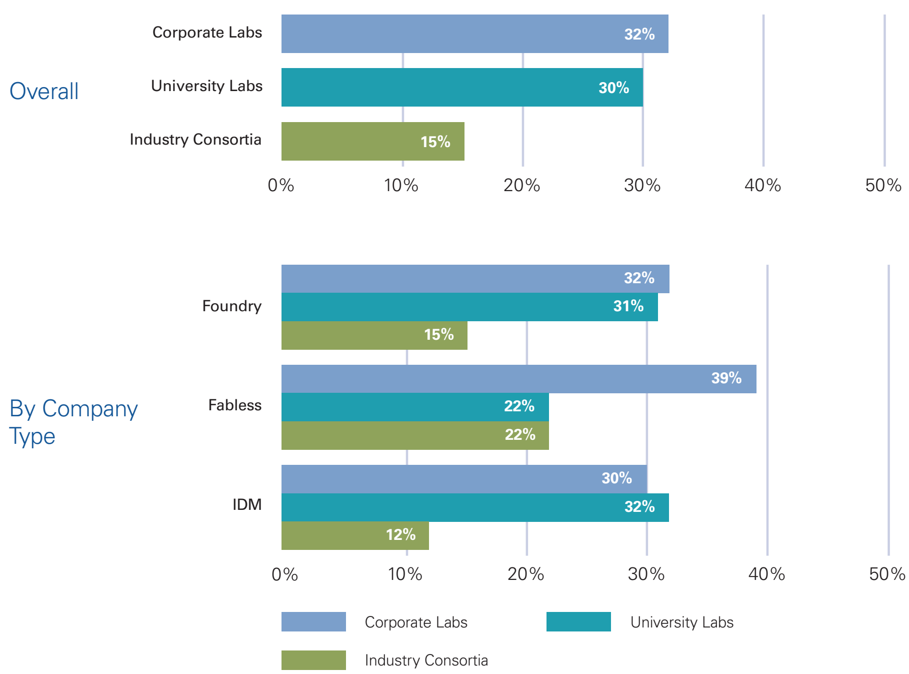
Percentage of R&D Budget by Company Type



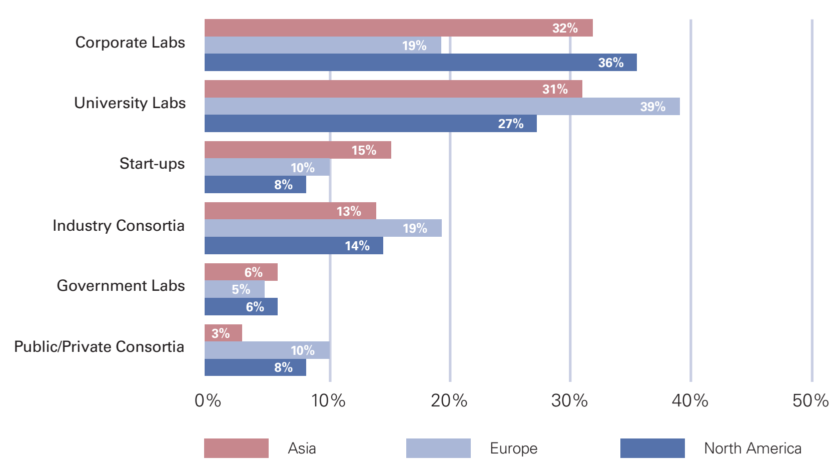
Question 18: It is widely predicted that within the next 15 years complementary metal-oxide semiconductor scaling will reach a barrier and be replaced by nanoelectronics. Where do you expect the next innovation to emerge?

When asked to rank the areas in which innovations are likely to originate, responses were heavily skewed toward corporate and university laboratories, with industry consortia a distant third. Organized by geography, European companies ranked university laboratories as the number-one source for future innovation. North American companies ranked corporate laboratories ahead of university laboratories, and Asian companies ranked them about equal in importance.

Sources of Innovation



Percentage Responses by Region

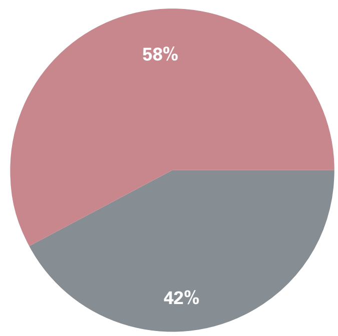


Question 19: If a consortium were created to develop nanoelectronics (defined as "beyond CMOS") would your company participate?

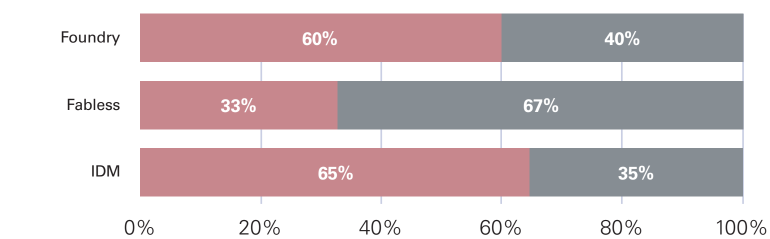
Although consortia ranked third as a source of innovation, 58 percent of respondents said that they would participate in a consortium created to develop nanoelectronics, defined as "beyond CMOS." IDMs and foundries would be the most willing participants, and on a regional basis, European companies would be most likely to join.

Percentage Consortium Participation

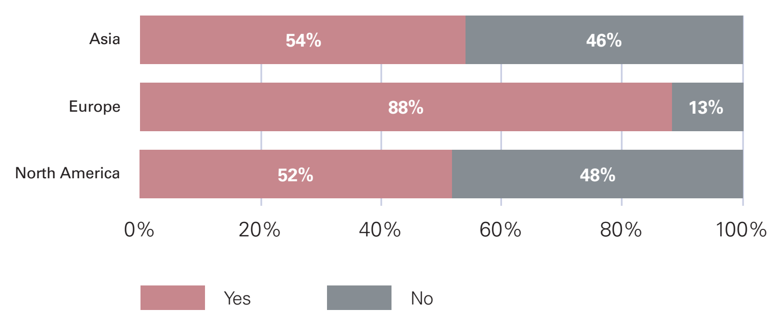
Overall



By Company Type



By Region

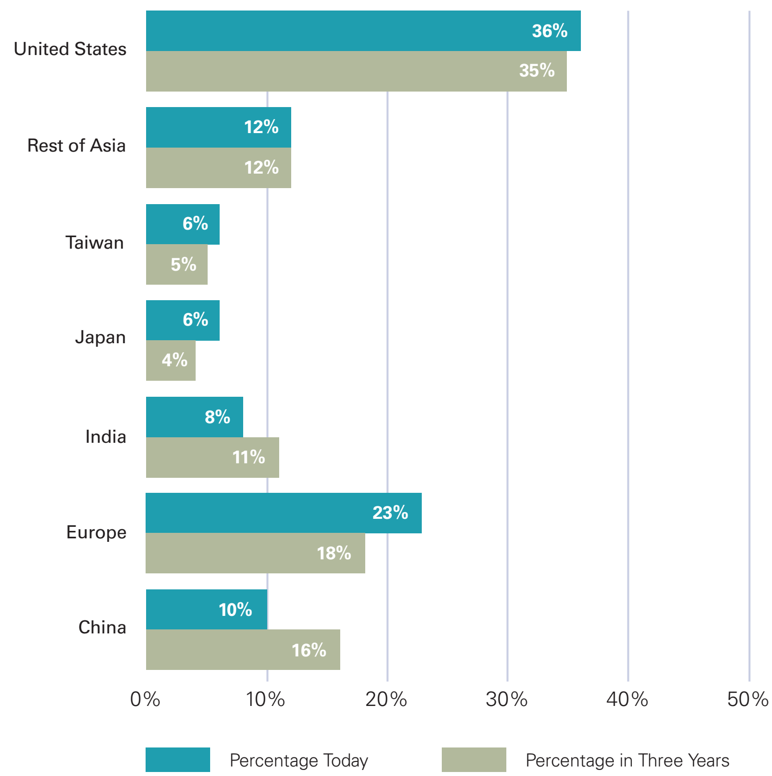


Question 20: Please rank in order of importance the top three regions where your R&D budget is now allocated.

Question 21: Please rank in order of importance the top three regions where your R&D budget will be allocated during the next three years.

When asked in what regions R&D budgets are allocated now—and projecting forward three years—executives in every region reported a different investment pattern. European companies said they are reducing their R&D investment in Europe and in the United States in favor of significant investments in India, China, and Taiwan. North America is generally continuing R&D investment in the United States, while allocating increased funds to China, India, Taiwan, and ROA. Asian companies expect to increase R&D investment in China, Japan, and India, while reducing investment in the United States, Europe, Taiwan, and ROA.

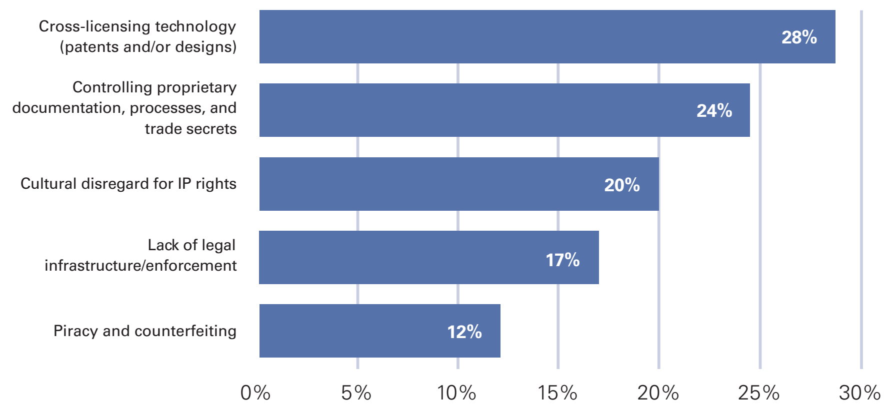
Regional R&D Budget Allocation: All Respondents



Question 22: From the following list, please rank the top three IP protection issues that impact your business.

The respondents were asked to rank the top three IP protection issues from a list of five options. The ranking of concerns was "cross-licensing technology" first and "controlling proprietary documentation, processes, and trade secrets" second.

Importance of IP Protection Issues: All Regions

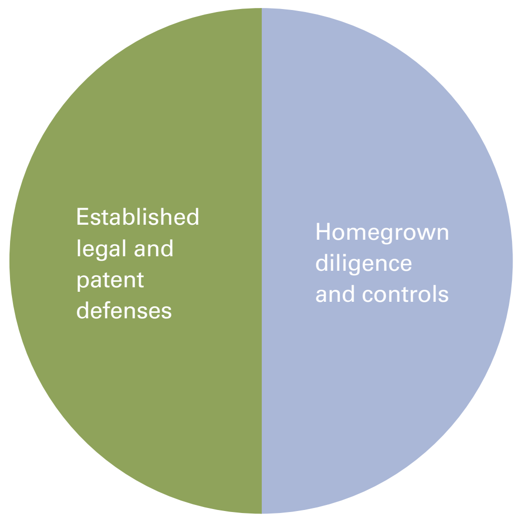


Question 23: Considering the global nature of your business, what is the primary strategy your company employs to protect its design and process intellectual property?

When asked an open-ended question regarding strategy for protecting IP in a global business, respondents overwhelmingly stated their reliance on established legal and patent protections as a defense. Many respondents also emphasized practical homegrown solutions such as educating their workforce about IP control.

Clearly, however, there is no consensus among industry executives that would point to a "silver bullet" to help mitigate this growing area of concern.

Distribution of Strategies Cited to Protect Intellectual Property



Selected Responses*

- Suits filed against companies selectively
- A patent portfolio and the legal protections it provides
- Vigorous prosecution
- Proactive cross-licensing

Selected Responses

- Data security, rapid product cycles, diligence
- Limited access in non-U.S. regions that have a reputation for "weak" IP protection
- Strict internal controls
- Employee training

*Selected responses are examples of most-often-cited approaches.

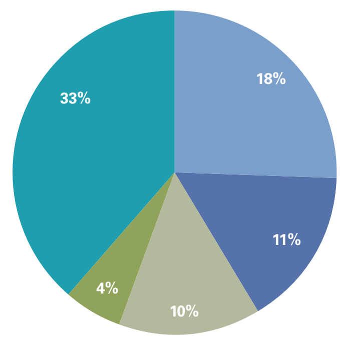
Question 24: Are stock options intended to be the primary component of your existing incentive compensation plan?

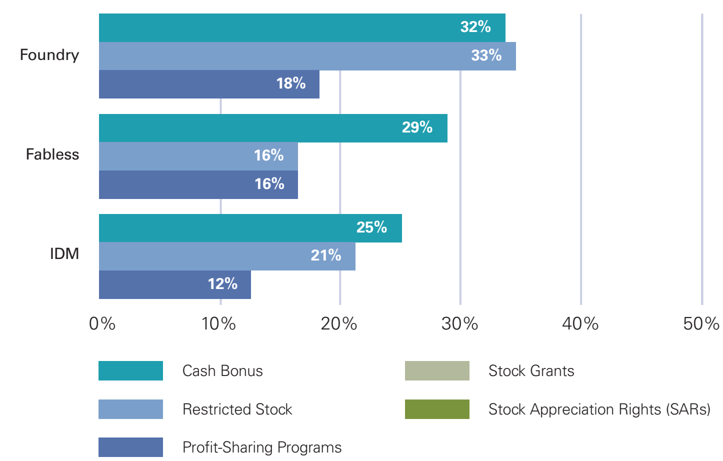
Question 25: With respect to the adoption of fair value accounting for stock options, what three incentive compensation methods will your company likely use in the future?

When asked if stock options are the primary component in their incentive compensation, 76 percent responded affirmatively. Asked to consider the adoption of fair value accounting for stock options and a replacement for stock options, "cash bonus" was the leading choice for replacement. Globally, respondents from all three regions preferred cash bonuses for incentive compensation.

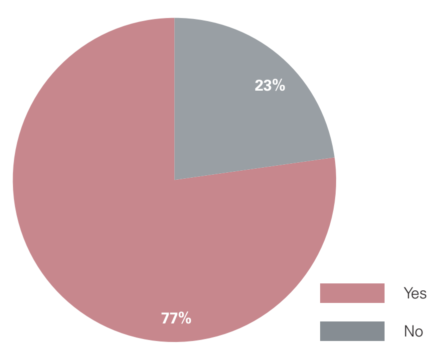
Top Incentive Compensation Methods in the Future

All Regions





Percentage of U.S. Companies Currently Offering Options as Primary Incentive Compensation



Contacts

Asia Pacific

Sean Choi
South Korea
+82 (2) 2112 0300
schoi@kr.kpmg.com

David Leaver
Singapore
+65 6213 2538
davidleaver@kpmg.com.sg

David Kong
Hong Kong
+852 2978 8266
davidkong@kpmg.com.hk

Yoshihiko Nakamura
Japan
+81 (3) 5218 6328
ynakamura@kpmg.com

Willis Yeh
Taiwan
+886 (2) 2715 9999
wyeh@kpmg.com.tw

Europe

Crispin O'Brien
United Kingdom
+44 (0) 20 7311 3080
crispinobrien@kpmg.co.uk

Frederic Quelin
France
+33 (1) 5568 7099
fquelin@kpmg.com

Bruno Wallraf
Germany
+49 (211) 475 7246
bwallraf@kpmg.com

Americas

Peter Doyle
Canada
+1 (416) 228 7189
pdoyle@kpmg.ca

Gary Matuszak
United States of America
+1 (650) 404 4858
gmatuszak@kpmg.com

Ron Steger
United States of America
+1 (512) 320 5212
rrsteger@kpmg.com