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## Globalization of the Storage Industry

### Title

Employment Patterns in the HDD Industry: Where are the Jobs?

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# Employment Patterns in the HDD Industry: Where Are The Jobs ?

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## ABSTRACT

**A** 3 year study of global employment patterns has been undertaken for three major sectors of the hard disc drive industry. The investigation shows the shift away from high cost centers to mainly Asian based low cost locations and the movement within Asia to find lower overheads or preferred centers of production.

## INTRODUCTION

For the past 3 years the Center for the Study of the Information Storage Industry at UCSD has tracked employment patterns in the hard disk drive (HDD) industry. This article reports on some of the changes in these employment patterns between 1995 and 1997. Specifically, the Center examined employment in three parts of the HDD value chain: final assembly, head production and media production. Together, these three activities account for more than 70

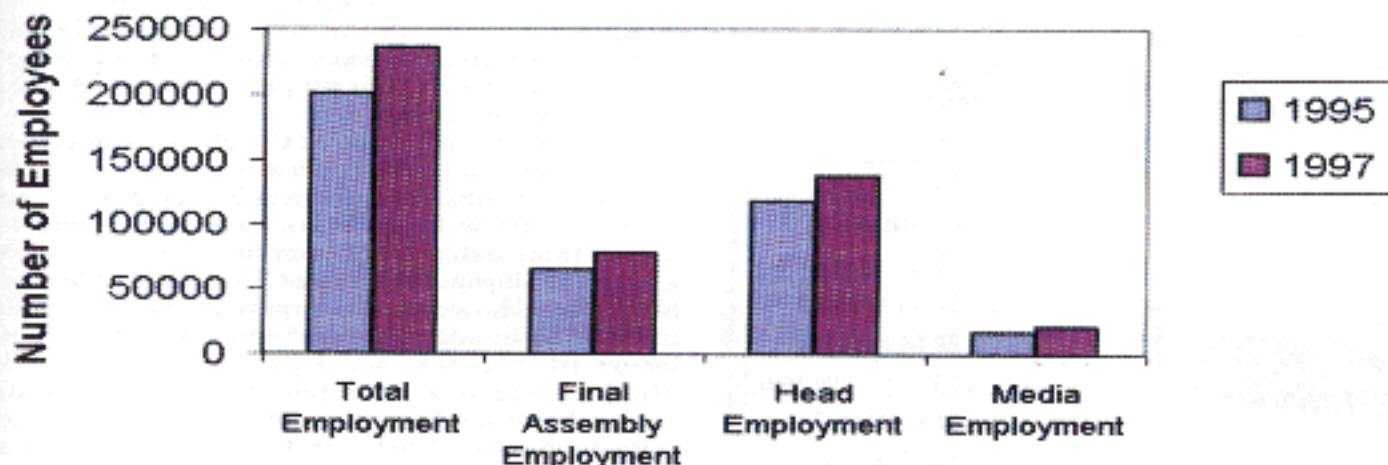
percent of total employment in the HDD value chain. For 1995 and 1997 the Center created a database containing information on the plants and employment of every HDD, media and head company in the industry. The data are organized by company, activity, country and region.

Total employment in these activities grew from 200,900 in 1995 to 236,300 in 1997—representing 18 percent growth over the two-year period, Figure 1. Head-related activities (wafer fab, slider production, head gimbal assembly and head stack assembly) make up the largest of portion of the total, with around 58 percent for 1995 and 1997. The share of employment in final assembly and media also remained fairly constant at around 33 percent and 9 percent respectively.

## GEOGRAPHIC DISTRIBUTION OF EMPLOYMENT

In 1981 nearly all of the HDD-related employment was located in the U.S., Japan and Europe. By 1995, however, 79 percent of heads, media and final assembly employment was located in Asia outside of Japan, with 58 percent in Southeast Asia

Figure 1. HDD employment, 1995 and 1997



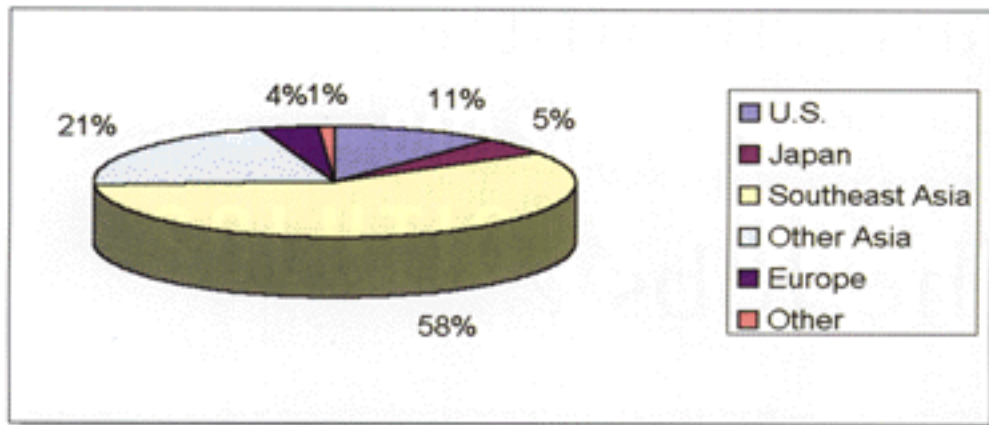


Figure 2. Total employment by location: 1995 (above) & 1997 (below)

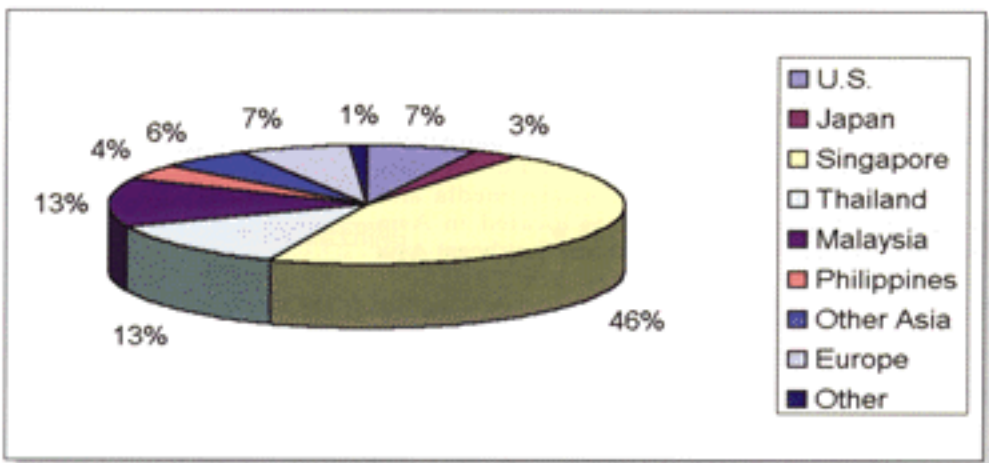
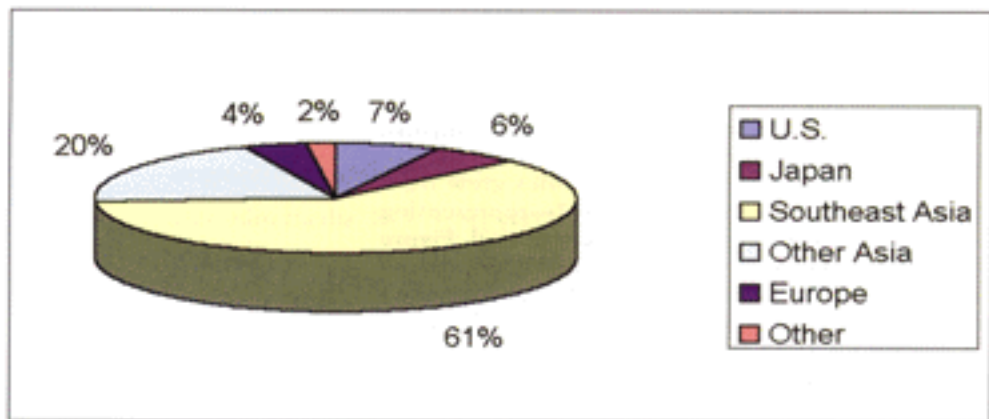
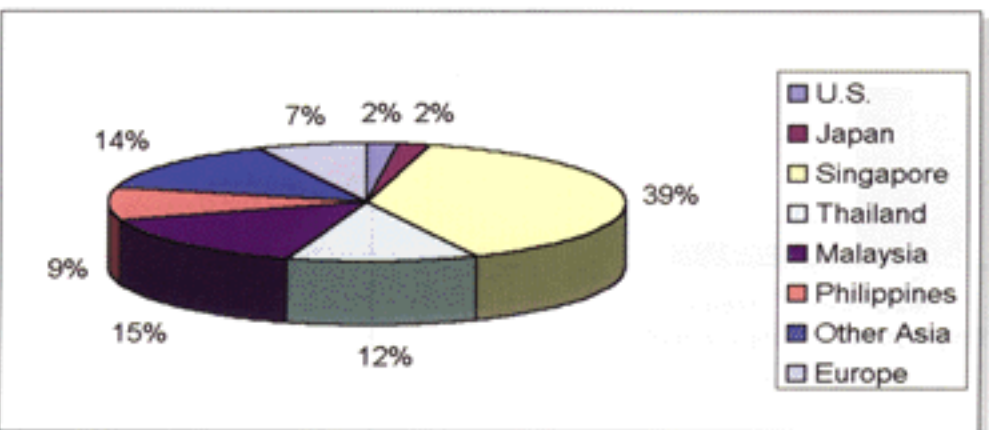


Figure 3. Final assembly employment: 1995 (above) & 1997 (below)



alone, Figure 2. The shift to low-cost Asian locations has continued. By the end of 1997, 82 percent of employment was located in non-Japan Asia, with 61 percent in Southeast Asia. Employment in the U.S. fell over the same period, both in absolute and percentage terms.

Thailand had the largest number of employees, accounting for 21 percent of the total employees in 1997, up from 18 percent. The next three largest employers were Malaysia, Singapore and China. Together these four countries employed around 67 percent of total workers in both 1995 and 1997.

Several countries experienced large percentage gains in employment between 1995 and 1997. Leading the pack were Hungary, where the expansion of IBM's HDD operations led to a three-fold increase in the country's employment, and Indonesia, which experienced a 60 percent employment increase driven mainly by a large expansion of Quantum's head-related activities in the country. Despite these rapid gains both countries still employ less than 5 percent of the total. Other countries in which HDD-related employment grew at a much faster rate than the industry rate of 15 percent were Thailand and Japan, (increased employment in Japan was largely a result of new investments in media and wafer fabrication facilities by Japanese firms). The Philippines, Malaysia and Europe, without Hungary, grew at just over the industry rate while employment increases in Singapore and China were less than the 15 percent industry rate. Two countries, Korea and the United States, experienced an absolute decline in total employment. Employment in these activities fell 20 percent in Korea between 1995 and 1997 and 19 percent in the U.S.

#### HDA AND FINAL ASSEMBLY: SINGAPORE STAYS ON TOP

Singapore has been the world's largest producer of hard disk drives for almost 10 years. It also has more employees engaged in final assembly than any other country. In 1995 Singapore employed nearly 46 percent of all final assembly employees. The country remained the largest employer in 1997 although its employment share fell to 39 percent. Thailand and Malaysia followed Singapore with a combined 26 percent of final assembly workers between them in 1995 and 27 percent in 1997. As a region Southeast Asia was home to around three-fourths of all final assembly employees in both 1995 and 1997. When employment in the rest of Asia, excluding Japan, is added to Southeast Asia's total, the percentage of workers in Asia rises to 82 percent in 1995 and 89 percent in 1997, Figure 3.

Looking more closely at the changes in employment across countries between 1995 and 1997 reveals some possible new trends. Over the course of the 1980s and 1990s final assembly operations moved from high cost locations in the U.S., Japan and Europe to Singapore and later Thailand and Malaysia. Since 1995, however, the largest growths in employment, both in aggregate and percentage terms, have occurred in a new set of lower-wage countries. Much of the new investment in HDD manufacturing facilities between 1995 and 1997 went to four countries: China, India, the Philippines and Hungary. Employment increased by 2,000 in Hungary, nearly 3,000 in China, 4,500 in the Philippines and

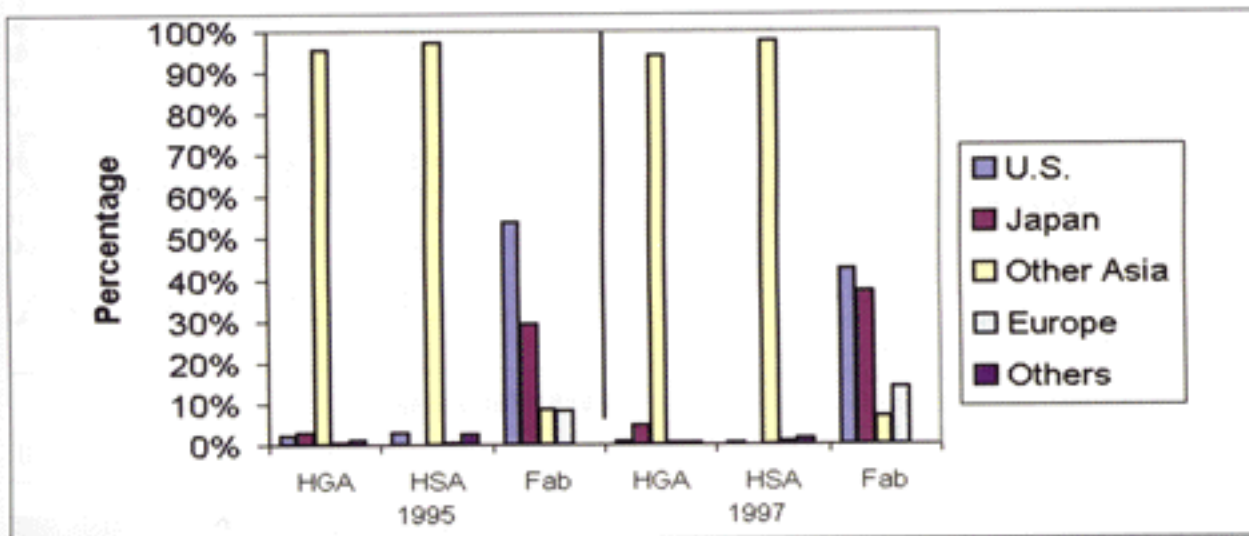


Figure 4. Location of head employment: 1995 & 1997

5,000 in India. There are notable differences, however, in the nature of this growth. Employment increases in China, India and Hungary were primarily driven by large-scale investments from single U.S. HDD firms. On the other hand, the HDD investment and employment boom in the Philippines was the result of investment by several Japanese HDD companies. In fact, the Philippines has become the offshore assembly location of choice for Japanese HDD firms. All of the four major Japanese HDD companies had final assembly operations in the Philippines by the end of 1997. Of these four only one firm had a major final assembly plant outside either the Philippines or Japan.

The employment data for final assembly also suggest that the industry trend of moving final assembly activities off-shore continued in 1996 and 1997. The number of employees doing final assembly in the U.S. fell by 75 percent over the period so that by year-end 1997 less than two percent of final assembly workers were located in the U.S. The story is similar for Japan. Japanese employment dropped by 17 percent, from 3 percent to 2 percent of the industry total.

#### HEAD EMPLOYMENT: THE FAB AND ASSEMBLY DICHOTOMY

The employment story behind the production of recording heads varies depending on whether we look at head production as a whole or break it down into smaller steps in the manufacturing process. For head-related activities as a whole the vast majority of the employees are located in non-Japan Asia: around 85 percent in both 1995 and 1997. Three countries employ the bulk of Asia's head employees: China, Thailand and Malaysia. In 1995 these three accounted for 68 percent of the world-wide head employment and 70 percent in 1997. On the other hand, the U.S., Japan and Europe combined made up less than 15 percent of total head employment in 1995 and 1997.

When we break down the employment into fab and assembly activities, however, a very different pattern emerges, Figure 4. HGA and HSA work is done almost

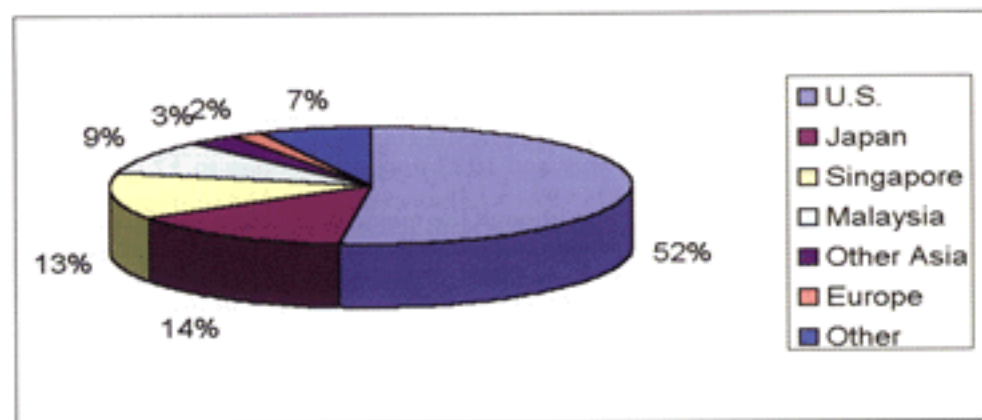
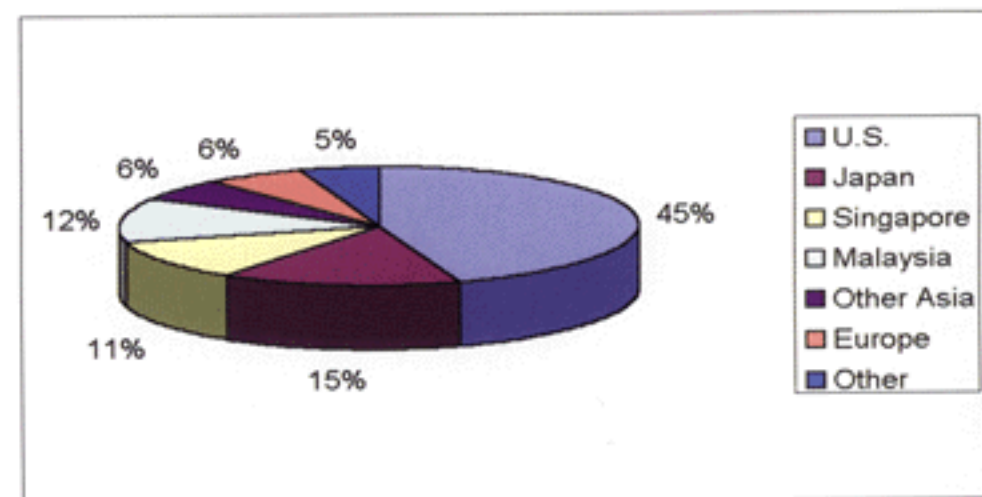


Figure 5. Location of media employment: 1995 (above) & 1997 (below)



entirely in non-Japan Asia. Ninety-five percent of the HGA employees were located in the region in 1995; 92 percent in 1997. Asian HSA workers (excluding Japan) made up 97 percent total HSA employment in 1995 and nearly 98 percent in 1997. The employment figures are very different for wafer fab. The bulk of wafer fab has remained in the U.S., Japan and Europe. In fact, the share of fab employment

increased for this group over the period of the study. In 1997 the U.S., Japan and Europe accounted for 93 percent of world-wide fab employees, up from 91 percent.

### **MEDIA EMPLOYMENT: U.S. AND JAPAN STILL LEAD THE WAY**

HDD and media firms have been slow at moving media production off-shore. The largest single media employer continues to be the U.S. In 1995 the U.S. accounted for well over half of world-wide media employees. In 1997 the U.S. still employed more workers than any other country or region, with 45 percent. Japan is the next largest country, with 14 percent in 1995 and 15 percent in 1997, Figure 5.

While media production remains centered in the U.S. and Japan, two Southeast Asian countries, Malaysia and Singapore, have recently been attracting a significant amount of media investment. Singapore's percentage of media employees was nearly 13 percent in 1995. The number of media employees increased in 1997, although at a slower rate than world-wide media employment, resulting in a slight fall in Singapore's employment share to 11 percent. Malaysia finished 1995 with 9 percent of the industry's media employees and new investment in 1996 and 1997 upped this share to 12 percent by the end of 1997.

Although the majority of media production jobs remain in high wage countries, media employees are only a small percentage of total HDD-related employees (8-9 percent). Most of the jobs in final assembly and head production have moved to low-cost countries in Asia. While this trend is likely to continue, the rate of employment growth is likely to slow in 1998 as a result of overcapacity problems in the industry together with a drop in the demand for HDDs as a result of the Asian economic crisis. Several plant closures and employee lay-offs were announced in the first quarter of 1998, mainly by industry leader Seagate, which announced plans to cut 10,000 jobs last January. The biggest cuts are in Malaysia and Thailand (over 4,000 combined), U.S. (around 1,300) and Singapore (1,800). However, in the wake of these layoffs Seagate, along with other HDD, head and media companies, have announced plans to expand employment in other

countries. Seagate is scheduled to open a new head facility in the Philippines in 1998 which will eventually employ 10,000 workers. The Philippines will also be the home of new NEC and Fujitsu plants slated to start production in July, 1999. Maxtor is constructing a new final assembly plant in China and will expand its Singapore operations. IBM opened its new Thai final assembly plant during the first quarter, which should employ 2,000 by year's end.

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### **ABOUT THE AUTHOR**

Allen Hicken is a researcher at the Center for the Study of the Information Storage Industry, funded by the Alfred P. Sloan Foundation of New York. The Center is located at the University of California, San Diego ([www-irps.ucsd.edu/~sloan](http://www-irps.ucsd.edu/~sloan)).

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