



The Evolution and Future of Global Outsourcing

The two prongs of Charles Darwin's famous theory of evolution which he used to explain the Origin of Species, are as follows: (1) variability which occurs in nature in response to environmental stimuli and (2) the fierce struggle for survival that occurs because of limited resources. Those two conditions lead to breakthroughs in innovation in the biological world when the process of 'natural selection' allows the variations that have most successfully adapted to changing conditions to survive and continue reproducing.

This principle of biology has been applied to business to describe how quickly business models change and evolve in response to changing global conditions. Take for example, the evolution of the electronics contract manufacturing services industry. There are many business models currently in operation, which represent significant variations on the first arrangement. Companies can operate as Original Equipment Manufacturers (OEM); pure Contract Manufacturers (CM) or Original Design Manufacturers (ODM), but these categories increasingly are blurred, with many companies in both the ODM and CM categories co-designing or jointly designing products with their customers, and with numerous schemes for deciding ownership of the resulting intellectual property.

There are also companies in the ODM category that sell products under their own brand name, a practice referred to as OBM, or 'own brand manufacturing.' There are OEMs, particularly in China, that provide CM services to foreign OEMs when they have extra capacity. Indeed, the industry is evolving so quickly that it is difficult to outline a consistent historical analysis because of convergence in the industry product sectors and in the characterization of the companies themselves.¹ TFI (spell out first use) analysts believe that conditions are right for the emergence of new species of electronic manufacturing companies. This rapid evolution of business models will accelerate, and as the industry moves forward will be an important focal point for innovation and competitive advantage for companies that manage these complex relationships profitably. The supply chains that survive will be the ones that have most successfully adapted to changing environmental conditions.

¹ Technology Forecasters Inc's 2005 Five Year Forecast Report, pgs 11-15.

Five Year Forecast

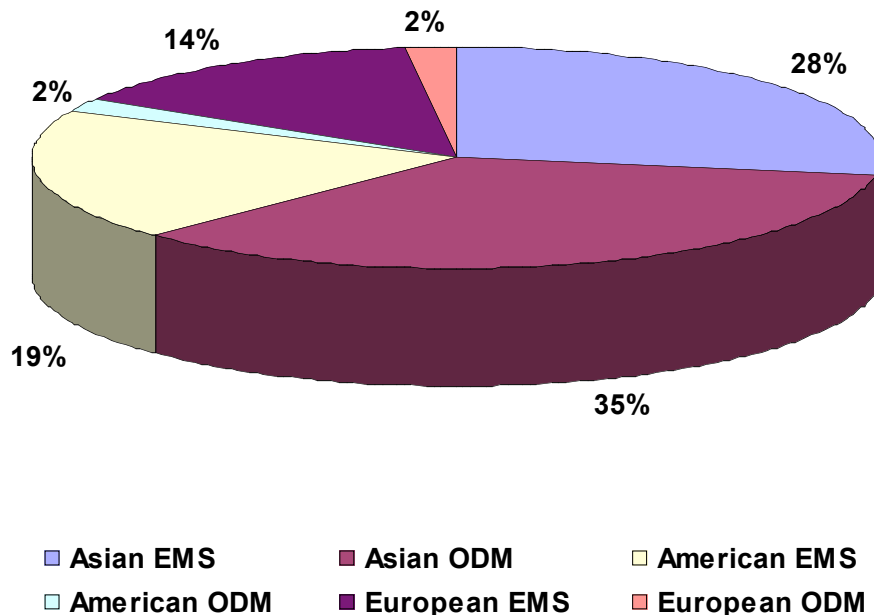
TFI analysts are forecasting the combined EMS/ODM industry growth rate for 2005 to be 13%. The ODM market is growing at a rate of 18% in 2005 and is forecast to experience moderate slowing over the next five years, with a compound 5-year annual growth rate (CAGR) of 16.3%. The ODM market growth rate is moderated not only by falling margins, which have led many ODM companies to focus on OBM, but also by the fact that ODMs remain largely excluded from many segments of the electronics industry. The ODM model is difficult or impossible to adapt to produce electronic products for industrial, medical, telecommunications infrastructure, or military applications. TFI believes that in the longer run (3 to 5 years) the growth of joint design manufacturing will open opportunities in other segments for ODMs.

Overall market drivers for ODMs include the fact that larger OEM companies in the high-volume computer systems and communications segments are taking advantage of the design, software and related services they offer. These customers are willing to enter joint development contracts with ODMs in order to better focus their in-house engineering and manufacturing assets on core competencies and strategic interests. ODMs have also benefited from the continuing shift in manufacturing toward China, leaving only token or niche-oriented manufacturing facilities in Taiwan.

EMS growth rates are more moderate, but we believe that they will follow a similar pattern. EMS is growing approximately 10% in 2005, down from nearly 20% in 2004. Approximately 22% of new revenue for the companies tracked is due to rapid growth in one company, Foxconn. Overall EMS drivers include overall total available market (TAM) growth for the electronics industry; entry of new OEMs into outsourcing; sales to ODMs; and growth in segments that are less available to ODMs.

Regional Growth Rates

Regional Distribution of Total Outsourcing for 2004



Over the next five years, regional distribution is forecast to shift only slightly; in the Americas, dropping from 21 to 19% by 2009; in Europe from 16 to 15%; with Asia increasing from 63 to 66% of the total global combined contract manufacturing revenue.

Why OEMs Choose NOT to Outsource

In a recent TFI Report, our analysts asked a representative group of OEMs why they had chosen not to engage with contract manufacturers.² Here are some of their reasons:

- Total landed cost considerations
- Control of IP/Fear of products' IP being stolen
- View the strategic decision to keep manufacturing in-house to be a positive competitive differentiator
- Belief that among the company's core competencies is manufacturing
- Utilization of outsourcing only to manage internal capacity utilization rate.
- Have not yet had the model proved to them
- OEM has sufficient internal capacity

² TFI Report, "Why OEMs Choose NOT to Outsource," by Eric Miscoll, November 2005.

- Quality assurance
- Internal resistance from stakeholders
- Work only with ODMs
- View in-house manufacturing as more economical
- Desire to maintain control of production
- Union contracts restrict it
- Concern over material pricing
- Limited awareness of second and third tier outsource providers

TFI tracks a metric we call EMS 'penetration rates.' TFI defines penetration as the ratio of EMS (or ODM) revenue to overall OEM cost of goods sold (COGS). This approach allows us to use widely published measures to create a standard yardstick for the volume of outsourcing within broad industry segments. However, not all COGS is accessible to outsourcing partners. That means penetration rates resulting from this calculation are conservative. In addition, some industries, notably military/aerospace, depend on considerable OEM-to-OEM outsourcing, which is not captured in these figures. TFI sets penetration rates currently at approximately 19%; we forecast that they will climb to nearly 24% by 2009.

TFI does not forecast an equilibrium penetration rate – defined as the percentage of outsourcing that will represent the end-of-the-trend shift on manufacturing from in-house facilities to outsourcing partners. However we have asked this question at scores of OEMs in all different segments for nearly 18 years. Our conclusion is that the rate will differ substantially by industry. Some, such as networking equipment, will be entirely outsourced, with penetration rates above 90%. Others, such as consumer electronics, may be closer to 40 to 50%. In either case, if current trends continue, the shift toward outsourcing will not be exhausted until at least 2020.³

Market drivers for margin improvement

For both EMS and ODM companies, margins have fallen. Net margins dropped from 10% to just 4% for leading ODMs and as low as 1% for second-tier ODMs. Many large and mid-sized EMS companies have been operating at a loss. These financial conditions are unsustainable and are the evidence of the Darwinian 'struggle for survival' driving the acceleration in new 'species' of manufacturing relationships. The following table shows how each segment has responded.⁴

³ TFI 2005 Five-Year Forecast Report, pg. 24

⁴ TFI 2005 Five-Year Forecast Report, pg. 19

Business Model Drivers

Driver	EMS Models	ODM Models
Revenue-driven evolution	<ul style="list-style-type: none"> • Focus on emerging segments, e.g., medical. • Provide assembly services for ODM companies. • Serve OEMs newer to outsourcing. 	<ul style="list-style-type: none"> • Significantly reduce price in order to win larger contracts. • Consolidate and seek returns to scale.
Profitability-driven evolution	<ul style="list-style-type: none"> • Provide design services. • Develop intellectual property. 	<ul style="list-style-type: none"> • Launch own-brand manufacturing. • Continue shift of manufacturing from Taiwan to China.

Outsourcing Processes at Japanese OEMs

Outsourcing has evolved in different ways in different regions, based on different stimuli, and depending on such things as product lifecycle management strategy of the OEM customer.

For example, while Western companies favor outsourcing product manufacturing as early in the life-cycle as possible (including the engineering prototype stage), Japanese managers are more cautious. They tend to outsource *processes*, as opposed to *functions*.

Japanese OEMs typically develop, test and refine their manufacturing processes internally before they consider outsourcing. Then when satisfied with first pass yields, predictability, stability of the design, and overall product quality, the Japanese move the entire process – generally including the tooling, fixtures and test equipment – to China for volume production.

Western companies often look for the lowest-cost supplier for each new opportunity, while Japanese companies place a much greater emphasis on finding suppliers they can work with over the long-haul. Consequently, Japanese companies spend more time in the initial stages of the relationship. Contracting with Western companies is typically a more drawn out process, with agreements running 55-65 pages, covering every possible angle. Standard Japanese agreements tend to be no more than 10-12 pages, with responsibilities outlined in broad brush strokes. Japanese companies pay their manufacturing partners

faster than do their Western counterparts, who often require Chinese suppliers to manufacture, ship, and consign goods to distribution centers outside of China, but withhold payment until the products are sold to the end consumer – a practice that puts a heavy burden on their manufacturers' cash-flow.⁵

Outsourcing in China

As the outsourcing business model takes root in China, different stimuli again cause considerable variation. In TFI's recently released report on the indigenous Chinese EMS/ODM industry, "China Electronics Manufacturing and Design Services: Company Profiles and Market Forces," TFI analysts describe the many electronics entities making up the electronics industry in China today. They include global OEM, CEM (contract electronics manufacturing), EMS, and ODM, Chinese electronics manufacturing and design (EMD) providers, Chinese OEMs, joint ventures (JVs), wholly owned foreign enterprises (WOFEs), Chinese stock-holding companies, state-owned enterprises (SOEs), and private companies.

Chinese EMD services are forecast to grow from an estimated US\$38.3 billion in 2005 to a total of US\$74.7 billion in 2010. By comparison, combined global EMS and ODM revenue is expected to grow from US\$202.4 billion in 2005 to around US\$370 billion in 2010. Total available market (TAM) for electronics hardware is projected to increase from US\$1 trillion to around US\$1.5 trillion over the same period.⁶

Chinese companies are moving up the value chain in product design, hiring hundreds of engineers, and their engineering teams offer customers an increasing array of technical options and product features. Perceived advantages of China EMS/ODM providers include price, ability to service smaller size contracts, and the local Chinese company's facility in dealing with Chinese customs. Disadvantages are acknowledged in ease of communication, quality control, and intellectual property (IP) protection. Some Chinese EMS/ODM companies attack the communications problem with US or European offices and/or sales persons and managers recently hired from Silicon Valley.

Chinese OEMs expand abroad

Beijing-based TFI Analyst Mark Natkin reported on the Chinese Electronics OEMs in a recent *Thought Leaders* Newsletter article.⁷ Chinese electronics companies have been pushing to expand abroad for some time, but until recently

⁵ TFI *Thought Leader Newsletter*, November 2005, "Japan's Approach to Outsourcing in China," by Jeff Berger.

⁶ TFI Report: *China Electronics Manufacturing and Design Services, Company Profiles and Market Forces*, by Clive Jones, November 2005.

⁷ *Thought Leaders* Newsletter Number Eight, "Chinese Electronics Giants Push into First-Tier Markets" by Mark Natkin, July 2005.

the strategy was to export products designed and manufactured in China to price-sensitive, less developed markets like SE Asia, Russia and Africa. For example, telecommunications manufacturers like ZTE and Huawei first build critical mass at home by taking advantage of preferential government policies and easy access to local sales channels, and then leveraging these capabilities to win sales in markets their global competitors overlooked. In this way they have not only expanded revenues, but also gained valuable experience in the international marketplace.

While China's relatively late entry into the high technology arena placed it too far behind the curve to compete against Nokia, Lucent or Nortel in their home markets on existing technologies, the introduction of new Greenfield technologies, like third generation (3G) mobile communications has allowed China to align its R&D spend on the starting line of a whole new race.

Chinese OEMs are also quick to learn that to compete effectively in first-tier markets, they must provide local service, build brand awareness in the target market, and support local sales and distribution networks. So China's leading electronics and home appliance manufacturers have begun setting up overseas R&D centers, factories, and establishing distribution alliances or joint ventures with well-respected overseas brands. TCL, for example, formed a joint venture with French electronics giant Thomson SA in late 2003, giving the company access to both the Thomson and RCA brands, well-established North American and European distribution networks, industry-leading intellectual property, and production facilities in Mexico, Poland and Thailand. As part of its 3G network agreement with Telfort, Huawei is building an R&D center in the Netherlands, that will soon be augmented by a production facility in Hungary.

Think Globally, Act Locally

It may seem surprising that a country with a vast supply of engineers and factory workers willing to work for lower wages would establish overseas R&D and production facilities. However, the strategy solves some current challenges: first, Chinese companies have found that by using only domestic R&D resources, they have been unable to design products that satisfy international tastes. Haier, for example, found that when they tried to design products in China for the US market, there were often minor details that failed to meet American consumer needs. By 2002, three years after setting up a design center, marketing center, and factory in the US, the company's Haier-America branded mini-refrigerator had gained more than a 50% share of the US market. Haier also discovered that once US consumers began to perceive it as a local brand, it could cost-effectively add other product lines for US distribution at its South Carolina factory by keeping production volumes low and supplementing periods of higher demand with finished products or component shipped from its lower-cost China facilities –

thus simultaneously expanding their business base and leveraging their localized assets.

This practice of localizing assets close to Western markets also helps the Chinese respond to mounting pressure from the US and other WTO-member countries on currency valuation and trade surplus issues; plus it provides a means of avoiding anti-dumping cases – a major issue with the US, which over the past two years has brought more anti-dumping cases against China than against any other country in the world.

In 2005, an old concept began to gain credibility again within the global EMS industry and with ODM companies—locating production close to end markets, for flexibility and reduced transportation costs. This strategic opportunity, really a type of 'real option,' has been one factor behind the resurgence of EMS/ODM investment in Mexico and Eastern Europe after the 'gold rush' of 2003–2004 into China. The result has been a new emphasis on globally integrated operations for Tier-1 EMS and ODM companies, and flexibility in the supply chain.

Evidence suggests that this type of globally integrated operation presents a significant competitive threat to China EMD operations and to Chinese electronics OEMs generally.

While expansion overseas may be a good strategy for Chinese OEMs, it is not without challenges. Financing these projects can be daunting. To some degree, generous state-backed loans may continue to help supplement overseas expansion, and the Chinese government is encouraging them through further reduction and simplification of regulations. Companies are tackling the challenges in a variety of ways – through wholly-owned or joint-venture R&D centers and factories overseas, but also relying on OEM or distribution agreement with companies like Alcatel and Marconi to bolster their images and accelerate penetration. Lenovo has chosen perhaps the quickest route – acquisition of IBM's computer division, an established foreign brand – an option that provides some immediate benefits, but also carries the challenge of reconciling disparate corporate cultures.

Expanding globally carries significant future risk for Chinese OEMs. Two macroeconomic phenomena could have significant negative impact on overall worldwide GDP over the next five years: extended very high energy costs and the collapse of the housing bubble, either of which could lead to a drastic reduction in consumer spending and ultimately, recession. According to a study done by *The Economist*, the total value of residential property in developed economies rose by \$30 trillion over the past five years to \$70 trillion. This is an increase equivalent to 100% of the developed economies combined GDPs, and it represents a much larger increase in wealth than any other phenomenon, such as the 1990 worldwide stock market boom.

Most economists believe that housing prices will decelerate, but not drastically, and that high oil prices will be a drag on the world economy, but again not cause a recession. Consumer spending remains remarkably resilient; however if the current worldwide housing boom is indeed a 'bubble' consumers may cut back drastically, negatively impacting many industries, including electronics.

The Future is Green

Another global trend with significant potential impact on the electronics industry concerns the wave of environmental regulations such as Restrictions on Hazardous Substances (RoHS) in Europe, and the Waste Electrical Electronic Equipment, (WEEE) also in Europe. Similar legislation is pending in China, some states in the US, and elsewhere around the globe. Electronics manufacturers are in various stages of planning and implementing strategies to remove hazardous substances from products and provide for recycling. Because these regulations span the entire product lifecycle, and therefore involve multiple corporations in these complex and interrelated supply chains, implementation requires collaboration and a mind-boggling amount of documentation. Prudent managers are worried because they realize that – like Y2K – the clock is ticking and their products have to change in time, or they will lose customers. Yet the vast majority of OEMs are far from ready for the compliance deadlines – now just months away.

Here are some common explanations of why OEMs are not ready for RoHS and WEEE, and TFI's recommendations on how to overcome them⁸:

1. *Our component Bill of Materials (BOM)s are not yet all lead-free.* More components are ready than OEM managers might think. In interviews conducted by TFI in the Summer 2004 with 53 component suppliers, nearly all (94%) of the component suppliers were designing components compliant with RoHS and other regulations, and 44% were already manufacturing compliant parts. **TFI's Recommendation:** OEMs need to apply pressure to those suppliers not yet manufacturing compliant parts – especially those making custom parts. Plus it's time to re-specify compliant component for those parts likely to remain non-compliant.
2. *We are waiting on a BOM scrubbing service.* Content companies (software providers, distributors, third-party database managers, etc.) are scrambling to populate their databases with compliance information, but some are gathering information only on components they sell, or only about lead and not the other restricted substances, or only on broad parameters, perhaps not the specific data you need, and only for standard parts, and not your ASICs, specialized enclosures, and other customized

⁸ TFI Thought Leader Newsletter Number Three, "The Clock is Ticking – Are You Ready?" by Pamela Gordon, February 2005.

- parts. **TFI's Recommendation:** Start now by contacting or using a third party to contact your suppliers, instead of waiting any longer.
3. *Our executives have not established this as a priority or provided additional resources.* At this point, many executives have not yet recognized the gravity of ignoring or lightly addressing the new requirements. But you have. **TFI's Recommendation:** Present to the CEO and/or executive staff your estimate of the revenue losses the company could be facing if these deadlines are missed. And if possible discuss the potential for competitive erosion should inadequate resources be applied to R&D and new product introduction.
 4. *Our contract manufacturer is handling this.* How far along is your contract manufacturer, really? TFI has interviewed dozens of contract manufacturers in the second half of 2004 and then again in mid-2005; we found about ten ready for lead-free assemblies, a handful addressing substances beyond lead; and a lonely one or two with design for environment capabilities addressing product reuse, recycling and power efficiency. **TFI's Recommendation:** Most of the creative design for environment have come from OEMs themselves. Particularly behind the curve in design for environment are the contract design firms, typically. Be a leader in this space by starting now to design products for reuse and recycling.
 5. *WEEE is about recycling – so we'll deal with that when products are returned.* Reuse of products is the primary requirement set by the WEEE directive, followed by recycling. So OEMs should be designing products for reuse and upgrade, and not for landfills. Even to comply with recycling alone, ensure your products' materials and construction allow at least the minimum percentage of recycling required (by weight) for your category of products (e.g. 75% by an average weight for the IT and telecoms category) Finally, the WEEE directive also specifies that recycled materials should be used in the production of new electronic products. **TFI's Recommendation:** Some companies have been able to extract significant cost savings by re-designing their products for reuse; in addition, they have engendered increased brand loyalty by allowing customers to upgrade existing products. But it takes a corporate will to do the analysis and pre-planning to understand how to leverage the regulations for *profitable* green compliance.
 6. *First we'll get our new products to work, then we'll make sure they are compliant.* Starting early in the design process is the most cost-effective way to incorporate the environmental requirements and create robust designs. **TFI's Recommendation:** Build design for environment thinking into the entire product lifecycle and get ahead of the regulations.

The future of the global electronics industry is sure to include challenges and opportunities, as developing regions in Southeast Asia, the Middle East and Africa eye the skilled jobs and higher labor rates of electronics manufacturing. New varieties of relationships between companies providing product design and

manufacturing are likely to arise from the global electronics gene pool. The next decade will likely see countries such as Viet Nam, United Arab Emirates, and others enter the fray.

For more information on Technology Forecasters Inc., a US-based global market research and consultancy focused on the global outsourced electronics manufacturing and supply chain go to www.techforecasters.com.

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