



Engineering services Outsourcing- The next frontier in Global Sourcing

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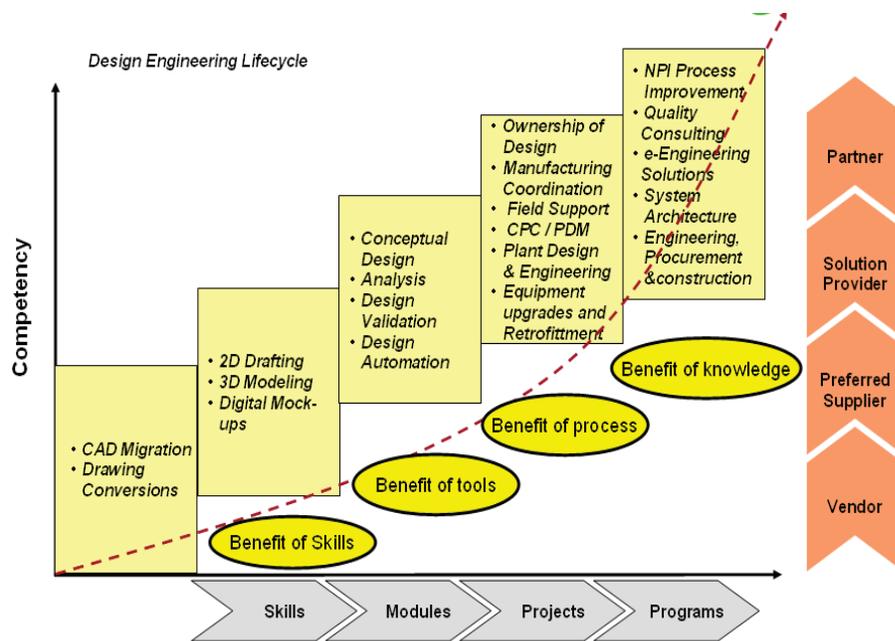
Engineering Services is an exciting new offshore outsourcing opportunity, especially for India. The market is expected to grow ~40% over the next 5 years, based on demand patterns, but increasing resource constraints need to be addressed quickly through privately funded education and training programs.

Introduction

Global sourcing for services remains a dynamic, and fast evolving, area of strategic business activity. Over the last few years, the basic business model - offshore outsourcing of simple, stable and repetitive tasks, primarily designed to save cost of labor - has seen a transformation to where complex, intellectual capital intensive functions can be effectively outsourced. This, the third wave in the evolution of offshore outsourcing (after IT Services and BPO), is broadly termed Knowledge Process Outsourcing, or KPO.

Within the KPO umbrella, a key area gaining attention and interest among Global 2000 enterprises is Engineering Services Outsourcing (ESO), where a significant part of the core IP development activities in Industrial sector companies is outsourced to specialized offshore vendors with highly skilled resources.

Engineering Services Outsourcing deals have moved fairly quickly from simple 2-dimensional and 3-dimensional Drafting and Architectural Drawing services to high-value Analysis and Design Services, including Computer Aided Design/Engineering and Finite Element Analysis that test the structural soundness of manufactured components; Computational Fluid Dynamics that test properties of fluid flow through manufactured components; and Noise, Vibration and Harshness analysis (NVH), that analyze external noise in automotive design. The chart below shows the typical trajectory of a Design Engineering Lifecycle.



Source: Tata Consultancy Services

As it stands today, ESO broadly covers the following activities:

- Product Design Services – Especially computer-aided design and drafting, concept validation, finite element analysis, etc.
- Prototyping – Manufacturing prototypes and testing involving advanced simulation
- Process Design – Design and implementation of processes associated with product engineering, including core manufacturing processes
- Product Testing - Testing design, execution and reporting
- Quality Control – Quality Assurance checks and Management of the QC processes

- Product Lifecycle Management (PLM) – Design and implementation of PLM applications for information management across the product lifecycle
- Plant Automation & Enterprise Asset Management

The Emerging Offshore Engineering Services Outsourcing Opportunity

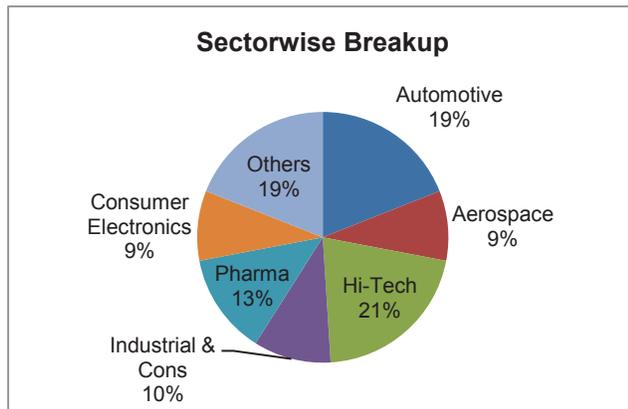
Global spending on Engineering Services is currently estimated at \$800 billion per year. By 2020, this figure is expected to increase to over \$1 trillion. Of the \$800 billion spending, however, less than 2% is currently outsourced offshore. Considering the growing imbalance between the demand for engineering skills and the availability of skilled resources within industrialized nations, and the active transformation of businesses into globally organized manufacturing centers, we expect to see a high rate of transition to global sourcing for Engineering Services over the next 5-10 years. Offshore ESO is expected to grow at an average annualized rate of ~40% over this time period.

Domains that have already started leveraging offshore outsourcing include mechanical, electrical and construction engineering design, embedded systems and chip design, instrumentation and controls systems, manufacturing processes and tools design, industrial design, product lifecycle management (PLM) and software product engineering.

The demand for ESO comes primarily from six key sectors:

1. Hi-Tech/Telecom (21%)
2. Automotive (19%)
3. Pharmaceuticals (13%)
4. Construction/Industrial Products (10%)
5. Aerospace (9%)
6. Consumer Electronics (9%)

These sectors together account for 81% of the ESO spend, with the remaining 19% coming from a wide range of other specialized verticals.



Drivers for ESO

On the demand-side, there are several key factors driving offshore Engineering Services, though the primary driver remains the ability of enterprises to access highly skilled, but less expensive resources. For example, India and China both have a very large pool of engineering graduates (India graduates over 400K engineering and equivalent majors each year) available to support the product design, process design, prototyping, testing, QC and reporting functions. In addition, with many industrialized nations across North America and Western Europe leveraging offshore *manufacturing* capabilities to bring down production costs, the deep knowledge of manufacturing processes accompanying that experience in contract manufacturing provides the exporting countries with the ability, now, to offer services in upstream areas thereby further reducing the total cost of the production process.

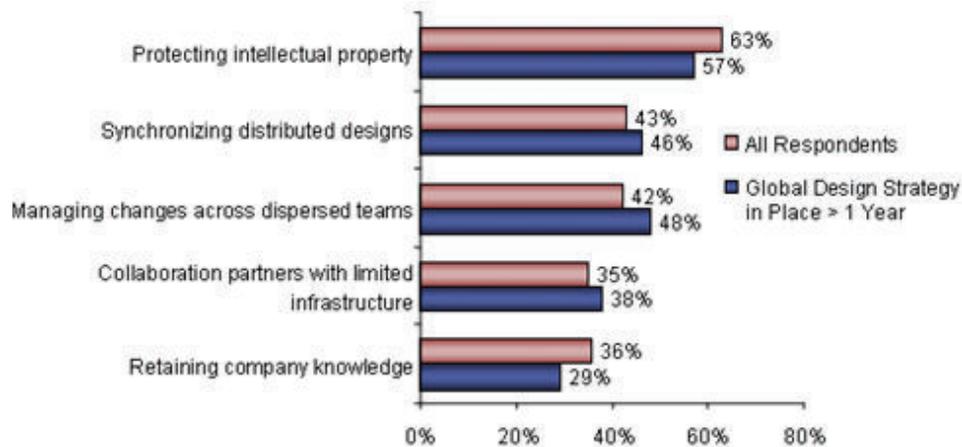
The skills, knowledge and capabilities can be leveraged to lower cost (estimated at ~30%), reduce time to market (reductions of ~15%-20% in product development cycles), acquire intellectual capital, gain access to markets in geographies where work is outsourced, and build flexibility into resourcing of the production process.

On the supply-side, the focus on Engineering Services is being driven by better business metrics than the other *traditional* outsourcing services. Given below are the typical business metrics for an ESO model:

Metrics	ES Outsourcing
Margins (EBIT)	Overall margins in ESO range between 30-40%
Utilization	65-80%
Attrition	10-15%
Salaries	Entry level salaries in ESO range between \$6000 to \$ 11000 per annum in India. Selected domains within Hi-Tech, Automotive can be 40-50% higher.
Technology Cost	Typical technology cost in ESO are similar to other BPO businesses - 25%-30% of total cost, with high-configuration hardware and high license cost of tools balanced by lower telecommunications and connectivity costs.

Inhibitors to ESO

From the buyer's perspective, investment in ESO is inhibited by the relative immaturity in managing the collaboration process across the multiple necessary interfaces, and a deep concern for the loss of core Intellectual Property through lax security and IP protection standards among vendors (see chart below).



However, in our judgment, one of the primary inhibitors in the *offshore* ESO industry is a supply-side issue – the significant dearth of qualified engineering resources available to support the business model.

The ITO and BPO industries have been facing resource issues for several years, where rising salaries and increased attrition is challenging vendors in their ability to match client expectations of quality and productivity. According to HR executives of IT Service and BPO companies in India, *only a quarter of the available pools of resources are employable*.

These challenges are only exacerbated in the Engineering Services space, where the growth of economies like India and China, each of which is growing by double digits, is adding to the demand for strong engineering skills, leading to a severe resource constraint, especially in the industrial and construction engineering industries.

Service Provider Landscape for ESO

In 2007, Black Book of Outsourcing surveyed over 130 Engineering Services Outsourcing suppliers globally from 17 countries. The Top 20 vendors of ESO, identified by the survey in were: EASi, Eicher, Entegee, eServ Perot, Geometric, HCL Technologies, Hero Global Design, Hoyt Engineering, Infosys, Mahindra Engineering, NeilSoft, Onward Tech, Patni, Plexion, QuEST, Ranal, Rolta, Satyam, Tata Group and Wipro.

India and China were considered the two most important offshore ESO countries. However, given the shortage of 'employable' resources, and the significant demand generated by the growing domestic economies, other geographies, especially Eastern Europe and Latin America are likely to also become highly competitive regions for offshore ESO.

Companies providing ESO can be sub-divided into the following categories, namely:

- Offshore IT service providers that are adding an ESO capability, and
- Pure-play offshore service providers with a primary focus on ESO
- Offshore Captive units of Multinational companies
- Foreign pure-play ESO service providers setting up delivery facility in offshore locations

Examples of each type of supplier are shown below:

Company	TCS (Offshore IT provider with ESO capability)	Infotech (Offshore pure-play ESO provider)
Locations	Bangalore for Engineering Services	Hyderabad, Mumbai, Delhi, Bangalore
Employees	4500 +	5500
Verticals	Aerospace, Automotive, Manufacturing, Hi Tech, Consumer Electronics, Health Care, Mining/Metals, Chemicals, Oil and Gas, Power	Aerospace, Rail, Marine, Automotive, Oil and Gas, Energy, Telecommunications, Government, Other Utilities, Retail, Banking Services, Finance and Insurance
Key information	Partners – Flowmaster (world’s leading supplier of 1D fluid simulation systems), Apriso Corporation (A provider of adaptive operations execution solutions for manufacturing) Key Customers include - Airbus, Boeing, Pratt & Whitney, GE Aircraft Engines, TRW Automotive, Tata Motors, Nissan, Ferrari, GE Power Systems, MAN B&W, FMC, Caterpillar, John Deere , GE Oil & Gas, Ingersoll Rand,	Partners – IBM, HAL, UTC Geospatial analysis contributes to 40% of the company’s revenue Key customers include - Pratt & Whitney, Tele Atlas North America, Bombardier transportation

Company	ABB (Captive arm of MNC)	Cadence Design Systems (Foreign pure-play setting offshore ESO operation)
Locations	Bangalore (R&D, Robotics and Plant Automation)	China, Europe, India, Israel, Japan, Korea, North America, Taiwan
Employees	4000 in India	5200
Verticals	Automotive, Plant Automation, Oil & Gas, Life Sciences, Energy	Hi-Tech
Key Information	Global leader in Power and Automation ESO areas include - Compliance and Validation Services, Engineering Design Services, Process Optimization, Project Management, Safety Management, Reliability, and Plant Performance Improvement	Program Partners - Chartered Semiconductor Manufacturing, IBM, Jazz Semiconductor, Fujitsu, Tower Semiconductor, FAB, Z Foundry ESO areas include - Logic design, Advanced verification, Digital implementation, Custom design, PCB design, Advanced packaging/SiP.

Risks in Outsourcing Engineering Services

Though companies have been quick to spot the opportunity and are beginning to embrace ESO, there are a few key risks that need to be managed effectively:

- Highly collaborative processes mean that the challenges in developing and managing virtual global teams is even greater than in ITO and BPO operations
- Large number of deliverables, compliance requirements add to the complexity
- Highly iterative and ‘what if’ oriented optimization makes standardizing processes and measuring productivity more difficult
- Very high domain knowledge requirement lowers the ‘employability’ and ‘trainability’ thresholds for vendors, making recruitment even more challenging
- High degree of knowledge transfer from client is essential. This implies greater transition times, higher transition costs, and longer lead time to savings
- Client’s cost of exit is high, requiring a high level of commitment from the buyer

As a result, careful planning, vendor selection, transition management, and most importantly commitment from executive leadership is critical to the success of a strategic ESO initiative.

Conclusion

Outsourcing Engineering Services provides a great opportunity to organizations to develop strategies that significantly reduce the time to develop and market new products at a lower cost. In the current economic environment, this will definitely provide organizations with a new competitive edge. For this reason, the offshore ESO opportunity looks interesting and, we believe, is likely to grow very quickly over the next 5 years.

But, while the opportunity to reduce time and cost is enticing, and from the supplier’s perspective the business metrics look good, buyers should enter a relationship with an abundance of caution, under-

standing that outsourcing core business processes will require significant investment by the buyers, and with the realization that while the overall numbers for the global resource pool appear high, recruiting a strong, skilled team will be hard, in an environment where competition for talent is perhaps even greater than the competition for customers.

About the author

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