

Engineering Services by Global Service Providers in India

An excerpt for Infosys

**MARKET ANALYSIS AND FORECAST
THROUGH 2021**

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Table of Contents

Executive Overview	4
Major Trends.....	6
Industry Trends	7
Infosys Profile.....	14

Executive Overview

Engineering services market, catered solely by non-captive global service providers (GSPs) based in India, has grown over 11-12 percent in 2016 (estimated around \$7-8 billion). The market is expected to grow at 8-9 percent compound annual growth rate (CAGR) by 2021. Infosys has 9.5 percent market share in this market.

Engineering services augment and enhance the limited technical talent available in developed and developing countries to reduce costs, improve quality, create new products, and build infrastructure with increased value and shorter time-to-market. Engineering services provide a broad range of technical services including mechanical, electrical, mechatronics, software, information technology (IT), business process management, and more. This is essential for the development of product concept, product and industrial design, automation of plants, mechanical, electrical and embedded system design, maintenance of products and plants, asset management, product lifecycle-related services, detailed engineering, testing, and prototyping. In many organizations, engineering services are usually key activities among all engineering companies, startups, and IT providers. In most developed countries, there is a shortage of graduates in the science, technology, engineering, and math (STEM), and the primary value of engineering services is realized through providing these resources. A secondary benefit involves savings in terms of less time and money spent. Engineering services are a strategic activity and a competitive necessity for the adopters. A large number of STEM-trained people graduate from schools in India, and it has become the leading destination for those needing engineering services.

The industry has largely evolved in the last decade and more so in the last five years. In the early 2000s, India was thought to be a cost-effective destination for outsourcing commodity IT skills, and so some of the non-critical functionalities of IT were outsourced to the GSPs in India. From the mid to the turn of the decade, GSPs were seen as solution providers – to understand customers’ business problems and solve them. From the past few years, GSPs are considered for more strategic roles like co-innovation and joint development projects, which are based on risk-sharing model. Today’s competitive end user market and new enabling technologies are also expanding the horizon of engineering service providers. ARC has witnessed that GSPs in India focus on a variety of use cases in areas of interconnectivity of products and plants, working in disrupted environment with new partner

ecosystem to stay relevant, leveraging technologies such as Internet of Things (IoT), engineering analytics, 3D printing, artificial intelligence, machine learning, and innovative platforms to build intelligent, agile, and differentiated and smart ecosystem. GSPs based in India have proved that they are ready to take up challenges and have been successful too. This is primarily driven by the availability of skilled talent pool, service-oriented suppliers, domain expertise, and the ability to partner with customers on different business models.

Topline Summary

- In 2016, the engineering services market was led by the following five largest industries. Telecommunications, automotive, electronics & electrical, aerospace & defense, and machinery manufacturing
- The engineering services market witnessed strong growth in 2016, with majority of the suppliers reporting an increase in their sales. Looking at year-over-year growth, the market grew by around 11-12 percent in 2016.
- Major technologies contributing to the growth of engineering services GSPs are IoT, analytics, sustainability, and integration of automation and technology. Indian IT providers have also excelled in providing proprietary platforms for IoT technologies, artificial intelligence, machine learning, augmented reality and cognitive computing, and 3D printing.
- ARC expects orders from automotive, aerospace & defense, machinery manufacturing, medical product, electric power T&D, and pharmaceutical & biotech industry to drive majority of the growth during the forecast period.

Regional Markets

- North America is the largest market for engineering services, followed by EMEA and Asia. Latin America's market is quite small and accounts for around 1 percent of the market.
- Asia's engineering services market will grow at a slightly higher rate, compared with North America and EMEA during the forecast period.

Scope of Report Research

The Engineering Services Market Defined

Engineering services refer to the development of an altogether new product, process, or a service. These services include design elements of the product or service itself, infrastructure, equipment and processes involved in manufacturing them, maintaining them, or delivering them.

ARC groups engineering services into four major categories:

Product Engineering

The aim of product engineering is to design the company's products. Product engineering includes mechanical engineering, electronic engineering, embedded system design, and parts of product lifecycle management. Key objectives included reduce the time-to-market, reduce the design cycle time with low cost and high return on investment.

Process Engineering

The aim of process engineering is to design and implement the production processes. Process engineering includes tools and techniques for designing a process. The design is set to optimize capital and operational expenditures and achieve efficient output of products and services.

Automation-related Services

Automation-related services broadly comprise design and development of control systems - often PLC or DCS based. These systems enable managing and executing production activities and the related information to be shared across the organization in real time for analysis and decision purposes.

Asset Management-related Services

These services have more to do with achieving better maintainability, reliability, and availability of assets at any particular instance. It includes application development, configuration, and testing for Computerized Maintenance Management System (CMMS) or Enterprise Asset Management (EAM) packaged testing for CMMS or EAM packaged software implementation or upgrade. Integration between maintenance activities, functions and plant control systems such as manufacturing execution system, computer aided design/computer aided manufacturing, enterprise resource planning, and supply chain management.

Major Trends

The 2016 calendar year worldwide engineering services revenues provided by GSPs located in India has grown to over 11-12 percent in 2016. The market is expected to grow at 8-9 percent compound annual growth rate (CAGR) by 2021.

Shipments by World Regions

North America is the leading growth driver for EGSPs having a market size of 55-60 percent, followed by EMEA contributing 23-27 percent, Asia contributing 12-16 percent and Latin America at less than one percent.

Total Shipments of Engineering Services

In 2016, worldwide shipments of product engineering services provided by GSPs in India for the year 2016 were about 65-70 percent. ARC forecasts the product engineering market to grow at a CAGR of 8-10 percent for the years 2017 through 2021.

Worldwide shipments of process engineering services provided by GSPs in India for the year 2016 were about 8-10 percent. ARC forecasts the process engineering market to grow at a CAGR of 7-9 percent for the years 2017 through 2021.

Worldwide shipments of automation-related services provided by GSPs in India for the year 2016 were about 10-12 percent. ARC forecasts the automation-related services to grow at a CAGR of 8-10 percent for the years 2017 through 2021.

Worldwide shipments of asset management-related services provided by GSPs in India for the year 2016 were about 8-10 percent. ARC forecasts the asset management-related services to grow at a CAGR of 7-9 percent for the years 2017 through 2021.

Factors Contributing to Growth

Engineering services market is growing at a good pace. Global service providers form an important part of the strategic decision-making. The main factors that are contributing to the growth of this market include:

Maturity of Services

As the engineering services market matures, more and more customers are realizing that outsourcing of engineering services is much more than just the cost factor. ESPs have upgraded their engineering competencies and have made huge investments in infrastructure for compliance, certification, and technology adoption. Hence, they are in a position to execute end-to-end product engineering projects in line with customer expectations. ER&D services portfolio is witnessing greater emphasis on product engineering (end-to-end ownership) and innovation at both product and process levels.

While cost continues to be a relevant factor globally, other factors like innovating products for emerging markets, lowering time-to-market (gaining first-mover advantage), meeting government regulations, etc., are also gaining prominence and influencing outsourcing strategies. As a result, clients are becoming more open to offshore both low- to mid-complexity work (testing & validation, etc.) to very high complexity work (prototyping, concept development, etc.).

New Technology Trends

Many new technology trends have hit the market, which have contributed to the growth of engineering services GSPs.

- IoT - This is a major driver of engineering services offerings especially in machinery, health care, entertainment, automotive, security, etc. IoT will result in the development of new device categories. This will result in explosive growth in connected devices and a great need for engineering services across the lifecycle of the product/device.
- Analytics - The convergence of interests among the Chief Technology Officer, Chief Information Officer, and Chief Marketing Officer is resulting in increased pace of new developments in analytics space. Real-time analytics is resulting in faster and better decision-making systems.
- Sustainability - Sustainable and eco-friendly engineering such as renewable and alternative energy production, green buildings with energy modeling, leadership in energy and environmental design certified buildings will boost engineering services market
- Integration of Automation and Technology - Engineering services play a key role in efficiency and productivity of manufacturing industries. For

that reason, a high level of efficiency is needed at the engineering stage, as the first step toward better production. Efficient interoperability of all automation components based on open system architecture covering entire production process with consistent data management, global standards, and uniform hardware and software interfaces is where the engineering service providers will find more opportunities in future.

- Apart from the above-mentioned technologies, Indian IT providers also excel in providing proprietary platforms for IoT technologies, artificial intelligence, machine learning, augmented reality and cognitive computing, and 3D printing. ARC has also noticed that the service providers have invested in building state-of-the-art labs and R&D centers in India.

Developing Countries Seek More Services

In developed countries, the service sector generates more revenue than the industrial sector, whereas in developing countries, there is more scope for industrial growth. According to the IMF, the 10 largest advanced economies in 2015 according to GDP are the United States, China, Japan, Germany, the United Kingdom, France, India, Brazil, Italy, and Canada. The emerging economies in BRIC (Brazil, Russia, India, and China) countries have more scope of service growth.

Product Localization

The benefit of localization is to have access to more markets. However, there are considerable costs involved, which go far beyond just engineering. Firstly, the software needs to be re-engineered. Secondly, providing a localization package for a specific language is in itself a tedious task. This requires specialized technical writers to construct an appropriate syntax for potentially complicated technical concepts, coupled with engineering resources to deploy and test the localization elements. Thereafter, business operations must adapt to manage the production, storage, and distribution of multiple discrete localized products, which are often being sold in completely different currencies, regulatory environments, and tax regimes. Lastly, sales, marketing, and technical support must also facilitate their own operations in the new languages, in order to support customers for the localized products.

Factors Inhibiting Growth

Though there are many growth opportunities ahead, suppliers struggle with some inhibitors as well. Change in outsourcing pattern of customers (e.g., demand for product manufacturing, turnkey engineering, and system integration type of services, which require high-end skills), poses a threat to the growth in the engineering services segment. Factors that are retarding the growth of engineering services GSPs market include:

Unavailability of Skilled Resources and Ecosystem

Availability of appropriately skilled engineers who want to make a career in hard core engineering services is limited. Almost all engineering services providers struggle to get right mix of resources. In the first place, the segment is challenging and requires a lot of technical as well as vertical know-how. The Indian educational system vs. the industry requirements is being bridged, but slowly. Additionally, there is a scarcity of consulting ecosystem of sourcing advisors as well, who can provide business justification for large-scale engineering services initiatives.

Geopolitical Issues

Majority of the revenues earned by the engineering services GSPs based in India come from North America and EMEA. In case these regions suffer an economic setback, the engineering services industry is adversely affected. Volatility in mature markets is delaying some of the new investment plans of OEMs. Market volatility like the slowing China economy, Brexit, adds to the delay in decision-making and many times reconsidering existing contracts.

Lack of Standardized Process

Outsourcing as a process, especially in engineering services is yet to mature; hence, the debate about core and non-core activities/skills continues. The risk-sharing model has its own liabilities, indemnities, and long-term warranties on production as engineered by the GSPs. Some competing standards in automation and automotive space are causing non-uniform and non-compatible products. Lack of adequate standardization for numerous emerging technologies (e.g., in IoT), coupled with regulatory constraints, hinders the growth of engineering services outsourcing. Earlier bigger companies were more involved in standardization that would then be followed by medium and smaller companies. But now, there are many small

and medium-sized businesses and startups that are also involved in making standards.

Increased Competition from the Captives

Increasing captive centers by the OEMs such as R&D centers by companies like GE, Honeywell, GM, Philips, Siemens, Toyota, etc., creates a stiff competition for outsourcing service providers. Customers prefer captives to engineering service providers, despite lack of skill and operational efficiency. Captive operations have grown significantly, although the rate of that growth is slowing as customers begin to recognize the need to optimize and focus on improving captive operations. In some cases, captives provide lower costs and significant benefits to parent firms. Increasing usage of captives as an offshoring model by companies has been a major factor inhibiting the growth of the engineering service provider industry.

Growing Competition from Low-cost Countries

Competition from other low-cost (local) countries like Eastern Europe and Southeast Asian countries is overtaking the cost advantage that GSPs in India have. Emergence of engineering services destinations such as China, Argentina, and Eastern Europe could pose a potential threat to Indian engineering service providers.

Lack of Control over Product Development/IP Concerns

Reservation about loss of IP has been another major concern that has limited the number of companies collaborating with service providers for engineering activities.

End-to-end Services by Product Vendors

More and more product companies are providing end-to-end services themselves. This is having a direct impact on growth of traditional and pure-play engineering services.

Industry Trends

Vertical-specific trends such as deconsolidation in automotive and low-cost products from medical devices for emerging markets have increased competition. This has forced multinationals to equip themselves with latest technological advances in the products and services space. Some of the

industries with increasing involvement of engineering services and fast growth are automotive, aerospace, machinery manufacturing, electronics and electrical, semiconductors, and telecommunications.

There are some other industries like medical products, mining & metals, and chemical & refining that do not have a bigger share in engineering services but are growing very fast. It is also obvious that IoT is having a major impact on all these industry segments and the trend will only grow. IoT presents numerous opportunities across industry sectors and processes. Almost all industry verticals are already investing in IoT solutions - and are getting benefited.

Aerospace & Defense

The global aerospace and defense sector is poised to experience stronger growth in 2017 and beyond, following several years of steady, but slower growth rates. A relatively stable GDP growth rate worldwide, lower commodity prices, and strong passenger demand - especially in the Middle East and Asia Pacific regions - will drive the commercial aerospace sector. Commercial aircraft backlog is at an all-time high of around 13,500 units. This represents more than nine years' production at the current annual production rate. The combination of stronger airline passenger traffic and lower fuel prices will likely drive carriers to order more new aircraft and, in turn, increase commercial aircraft production rates.

Automotive

The electrification of vehicles, new competitors from other industries, cost pressures, new materials and technologies, and demographic trends are coming together to increase pressure on automotive manufacturers and their suppliers. That said, all is not bleak in the global automotive market.

Globally, the automotive market maintained at a good pace in 2016. In North America, for example, sales stayed at the same high level as in 2015. Automotive unit sales were strong in most global regions, enabling steady revenues despite the continued strength of the US dollar.

Sales in the European Union have improved. Sales increases in large markets like Italy, France, and Germany helped offset a dip in sales in Britain. The overall European auto industry is struggling with ramifications of the "Brexit," plus the consequences of "Diesel Gate" and other scandals. The

most significant current downward macroeconomic driver globally, however, is the slowdown of economic growth in the emerging markets, although China is beginning to pick up the pace again.

Electronics

The electronics industry in 2016 was marked with continued effort to assemble the infrastructure, platforms, and “things” of IoT. After electronic industry revenues contracted significantly in 2015, revenues in 2016 were positive on a global scale, mainly driven by the IoT boom. Investment levels remained high. ARC expects a moderate growth in 2017 and 2018 and beyond.

Machinery Manufacturing

Investments in the machinery manufacturing industry are closely tied to the cycles and financial stability of customers in the key end user industries, such as automotive, aerospace & defense, mining, metals, food & beverage, and pharmaceuticals.

Semiconductor

Semiconductors are crucial for all electronic devices, providing the “brains” for smartphones, PCs, tablets, medical equipment, and other smart products. Continuing advances in semiconductor technology will make electronic devices smaller, faster, more reliable, and inter-connected; helping to support IIoT-based solutions. In recent years, the industry matured and moved from large swings in CapEx to smoother investment cycles.

Telecommunications

There are various types of services provided to the telecom industry. One is for the telecom equipment manufacturers, while the second is for network engineering. The second type (network engineering) is a big market catered by Indian GSPs, but this market is not the focus area of ARC’s Engineering Services study.

Infosys Profile

Supplier	Location	Services	Website
Infosys	Bangalore	Core Engineering; Networking and Embedded Engineering; Software Product & Platform Development Engineering; Internet of Things	http://www.infosys.com/pages/index.aspx

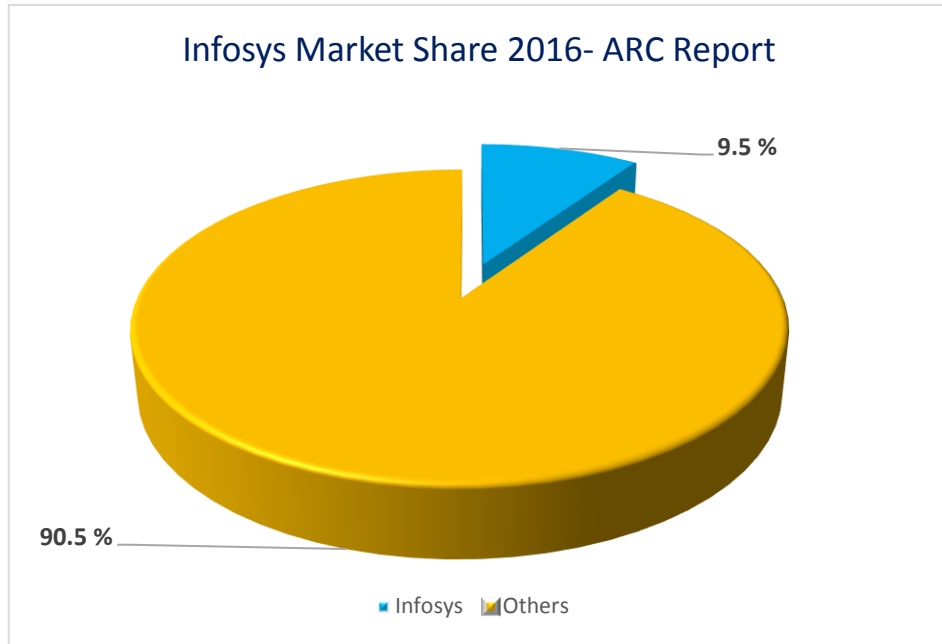
Company	Year/Acquisition
Infosys	March 2015 - Panaya, Inc.; Enterprise Software Management
	June 2015 - Skava; Digital Solutions

Key Services

Infosys engineering services has the following sub-service lines:

- a. **Core Engineering:** This includes Mechanical Product Design and Development, Turbo Machinery Plant Engineering, Aero Structures, Product Lifecycle Management (PLM), Knowledge-Based Engineering (KBE) , Complex Structure Design, Value Analysis & Value Engineering (VAVE), Plant Automation Control and Systems (PACS) including Industrial Automation and Control, Manufacturing Execution System.
- b. **Networking and Embedded Engineering:** this includes Product R&D, Network Engineering, Network Service Assurance, Network Systems and Enterprise services, Embedded Systems, Hardware and VLSI Design Services, Contact Center Engineering, Unified Communications, SDN/NFV and Media services.
- c. **Software Product & Platform Development Engineering:** This includes Specialized Software Product and Platform Engineering, product platform & QA Engineering, ISV Product Professional Services, DevOps Automation & Software Release Management, Point of Sale, and Geographical Information Systems (GIS).
- d. **Internet of Things:** Infosys has carved out IoT as a dedicated practice within the Engineering Services unit. This practice brings together expertise across the IoT technology stack, along with industry expertise, vertical

solutions and platforms, and vibrant IoT partner ecosystem to deliver both Industrial IoT solutions as well as Connected Products.



Description

Infosys is a global leader in technology services and consulting. It enables clients in 45 countries to create and execute strategies for their digital transformation. From engineering to application development, knowledge management and business process management, the company helps them find the right problems to solve, and to solve these effectively. It has a team of over 198,000 innovators, across the globe.

Infosys engineering services unit provides engineering solutions to support clients across product lifecycle of their offerings from product ideation and creation to sustenance and end-of-life management. This practice features deep core and emerging engineering skills, and strong ecosystem partnerships along with manufacturing and supply chain expertise that ranges from embedded firmware to composite material design to enable clients to reduce time to concept to market, redesign products for new demands, and value engineering for emerging markets. The company focuses on entire value chain improving the engineering (via Knowledge-Based Engineering Practice), manufacturing shop floor efficiency and service efficiency. Infosys has built “New” and “Renew” strategy within engineering domain. Renew is for serving the legacy and retrofit market while New is for new and emerging opportunities like IoT, Software Defined

Networking, Additive Manufacturing, Artificial Intelligence, Machine Learning, and platforms like IIP, IAP, IKP.

Initiatives and Products

Infosys has come up with some encouraging concepts and products listed below.

- Zero Distance - This concept involves being continually in touch with outside reality by continuously sensing it.
- Infosys Nia - This is a new product, designed to provide artificial intelligence for the enterprise.
- The company's end-to-end engineering portfolios cover core engineering, networks & embedded engineering, software products & platform development engineering, and IoT. Infosys Engineering has sister horizontal units with additional focus-related areas - Infosys Digital, Enterprise Mobility, Data and Analytics, Cloud and Infrastructure Services, and Infosys Center for Emerging Technology Solutions.
- Advanced Engineering Group: Highly specialized doctoral SMEs bring rich experience in KBE, Artificial Intelligence, Fluid Dynamics, Engineering Analytics, Advanced Materials, etc. This has enabled the team to deliver highly domain customized projects to its clients on composite turbine blade design, design lighter fuel-efficient aircraft components, etc.

IoT Initiatives

IoT is a part of the technology service offering, and the company has had developed many IIC-approved Testbeds

- Asset Efficiency Testbed
- Infosys Connected Care Testbed
- Infosys Smart City Energy Management Testbed
- Infosys Precision Crop Management Testbed
- Infosys Smart Water Management Testbed

Infosys offers IoT-related services to various industry segments like Aerospace, Oil & Gas, High Tech, Medical Electronics, Farming, and Transportation. Its consulting-led engagements involve high-end solutions for improving various efficiencies like operational, maintenance, service, information, and energy efficiency. Beginning with the design thinking stage, most of these engagements cover the entire lifecycle from business and technical consulting, design, development, to maintenance support and enhancements. It has helped various industries in asset efficiency improvement, track and trace, condition monitoring, and predictive maintenance. The company has helped create more intelligent linkages between the three phases of manufacturing – design, production, and field testing/service. By capturing, analyzing, and relaying real-time sensory and historical data at each of these phases, the client systems enable Infosys generate insights that can help field engineers and service teams identify the root cause of component failure easily, and provide faster corrections to flaws in design engineering and manufacturing operations.

IoT Partners

- Asset Efficiency Maturity Model along with the Institute for Industrial Management (FIR) at the University of Aachen, Germany
- Kuka and Infosys announced Industry 4.0 Partnership
- Collaborated with GE Digital on Industrial Digital Twin
- Collaborated with GE Digital on Asset Efficiency Testbed and Industrial Digital Thread Testbed
- Infosys is having strong relationships with leading universities like Stanford, Berkeley, IITs in this space.

Key Strengths

Infosys has obtained domain knowledge acquired across industries by performing a variety of engineering services. It has leveraged the range of capabilities by cross pollinating the learnings to provide clients with superb solutions.

Infosys has a very good ecosystem of integrator technologies in the Engineering domain. It has partnerships in emerging high technology areas such as IoT, additive manufacturing, augmented reality and virtual reality.

This also includes partnerships with industry consortiums such as IIC and with academia such as Aachen University and Acatech (German Academy of Science and Engineering).

Infosys has a proven record in important industry segments like aerospace, oil & gas, high tech, medical electronics, agriculture, and transportation. Infosys' engagements have included advanced solutions for improving various efficiencies in operations, maintenance, services, information management, and energy efficiency.