

Research Article

Charting the Transition from Global Service Provider to Product Powerhouse

Partha Majumdar* 

Department of Computer Science, Swiss School of Business and Management (SSBM), Geneva, Switzerland

Abstract

This report examines the strategic crossroads facing India's IT sector, which has achieved remarkable success as a global service provider but lags in software product development. Despite projected revenues exceeding US\$283 billion in FY25, the sector's reliance on a services-based business model, characterised by resource augmentation and labour arbitrage, creates a significant strategic imbalance. While this model has fuelled substantial economic growth and employment, it has hindered the creation of globally recognised software products. However, India's near-parity in next-generation technologies, particularly AI, coupled with a burgeoning domestic startup ecosystem and supportive government policies, presents a strategic inflexion point. The report argues that transitioning to a product-led growth model is no longer optional but essential for long-term success. A detailed strategic roadmap is proposed, encompassing internal incubation, strategic acquisitions, corporate venture capital, and a fundamental reimagining of talent management. High-potential deep tech domains—including industrial intelligence powered by Deep Reinforcement Learning, high-trust systems integrating AI and Blockchain, next-generation cybersecurity platforms, and AI integration in the defence sector—are identified as areas where India can build world-class products. The report concludes that this shift from service provider to intellectual property creator is not just a corporate imperative but a national economic necessity to establish India as a true 21st-century digital powerhouse.

Keywords

India's IT Sector, Product-led Growth, Services-to-products Paradox, Deep tech Domains, Strategic Transformation

1. Executive Summary

The Indian Information Technology (IT) sector stands as a monumental testament to the nation's success in the globalised economy. For over three decades, it has been a primary engine of economic growth, a massive generator of employment, and a crucial source of foreign exchange, establishing India as the undisputed back office to the world. With projected revenues set to reach US\$283 billion in FY25, the industry's scale is undeniable. However, this success has been built almost exclusively on a business model of IT ser-

vices, consulting, and business process management, a paradigm often characterised as resource augmentation or labour arbitrage. This has created a profound strategic imbalance: while the sector is a services juggernaut, it has conspicuously failed to produce a significant portfolio of globally recognised and adopted software products. The historical justification for this product deficit—a technological lag behind established Western firms—is rapidly becoming obsolete. By 2025, India will have achieved near-parity in critical,

*Corresponding author: partha.majumdar@hotmail.com (Partha Majumdar)

Received: 13 September 2025; **Accepted:** 23 September 2025; **Published:** 18 October 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

next-generation technologies, particularly in Artificial Intelligence (AI), possessing one of the world's fastest-growing pools of AI-skilled talent. This convergence of technological capability, a maturing domestic startup ecosystem, and a supportive government policy framework has created a strategic inflexion point. The imperative to pivot from a services-led to a product-led growth model is no longer a theoretical debate but an urgent necessity for long-term relevance and value creation.

This report presents a comprehensive analysis of this strategic challenge and offers a detailed blueprint for the transition. It begins by quantifying the scale of the "services-to-products" paradox, examining the internal factors—such as a risk-averse corporate culture, chronically low R&D investment, and a talent ecosystem optimised for service delivery—that have entrenched the current model. It then conducts an external analysis of the global landscape, highlighting the technological, economic, and political tailwinds that now make a product-centric strategy more viable than ever before. The core of this report is a multi-phase strategic roadmap for large Indian IT firms, proposing a structured approach to building product capabilities through internal incubation, strategic acquisitions, corporate venture capital, and a fundamental reimagining of talent management. Finally, the report moves from strategy to specific opportunities, identifying and detailing high-potential deep tech domains where India can build world-class products. These frontiers include industrial intelligence powered by Deep Reinforcement Learning (DRL); high-trust systems built on the synergy of AI and Blockchain for supply chains and finance; next-generation cybersecurity platforms; and the critical, sovereign imperative of integrating AI into India's burgeoning defence technology sector. The transition from a provider of skilled labour to a creator of intellectual property is the defining challenge for the Indian IT sector's next decade. Successfully navigating this pivot is not merely a corporate strategy; it is a national economic imperative that will determine India's position as a true digital powerhouse in the 21st century.

2. The Services Juggernaut and the Product Paradox

The narrative of the modern Indian economy is inextricably linked with the phenomenal rise of its Information Technology sector. Since the liberalisation of the 1990s, the industry has charted a course of unprecedented growth, transforming the nation's economic landscape and its perception on the world stage. It has become a global behemoth, a symbol of Indian intellectual capital, and a cornerstone of the country's

integration into the global value chain. Yet, beneath this towering edifice of success lies a fundamental paradox. The very model that powered this ascent—an unwavering focus on providing IT services—has simultaneously created a conspicuous void in the realm of software product innovation. This section dissects this dichotomy, quantifying the immense scale of the service's success while simultaneously exposing the profound and persistent product gap that defines the sector's current strategic crossroads.

2.1. The Scale of Success: A Global Services Behemoth

The economic contribution and global standing of the Indian IT and Business Process Management (BPM) sector are staggering. It has evolved far beyond a niche industry into a foundational pillar of the national economy. The sheer scale of its growth is a testament to its operational excellence and its ability to deliver complex services to a global clientele. The industry's revenue has demonstrated a remarkable trajectory, surging from US\$118 billion in FY15 to a projected US\$283 billion in FY25, more than doubling in a single decade. [30] This expansion is not merely a domestic phenomenon; it is overwhelmingly driven by global demand. Export revenue is anticipated to reach US\$224 billion in FY25, cementing the sector's role as a primary earner of foreign exchange for the country. [30]

This financial success translates directly into a significant macroeconomic impact. The IT sector's contribution to India's Gross Domestic Product (GDP) stood at approximately 7% in FY24 and is on a path to reach 10% by 2026, highlighting its systemic importance to national economic health. [40] This has made the sector a magnet for international capital. The computer software and hardware sector attracted cumulative Foreign Direct Investment (FDI) inflows worth a colossal US\$108.40 billion between April 2000 and December 2024, ranking as the second-largest recipient of FDI in the country. [9] This sustained influx of foreign capital underscores the global confidence in the Indian IT services story. The industry is also one of the country's largest employers in the formal sector, providing direct employment to millions and creating a vast ecosystem of ancillary jobs. This combination of revenue generation, export earnings, FDI attraction, and mass employment solidifies the IT services industry not just as a successful sector but as a critical engine of India's economic progress and stability. This very success, however, has forged a powerful path dependency, creating deep-rooted cultural and financial incentives that make any strategic deviation from the established services model a formidable challenge.

Table 1. Key Financial and Economic Indicators of the Indian IT Sector.

Metric	Value (FY25 Projections & Latest Data)	Source(s)
Total Industry Revenue	US\$283 billion	[30]
Export Revenue	US\$224 billion	[30]
Contribution to National GDP	~7% (FY24), projected 10% by 2026	[40]
Cumulative FDI Inflow (Apr 2000 - Dec 2024)	US\$108.40 billion	[9]
Projected Software Product Industry Revenue	US\$100 billion (by 2025)	[9]

2.2. The Dominant Paradigm: Resource Augmentation and Its Limits

The engine powering the Indian IT sector's remarkable growth has been a highly refined and scaled business model centred on resource augmentation and labour arbitrage. At its core, this model involves deploying India's vast pool of skilled, English-speaking technical talent to serve clients in developed markets, primarily North America and Europe, at a fraction of the cost of local talent. The revenue streams of industry giants like Tata Consultancy Services (TCS), Infosys, and Wipro are overwhelmingly dominated by IT services, consulting, and business process management. [17] Their primary value proposition has been the efficient, reliable, and cost-effective execution of technology projects and management of business processes for global corporations.

While immensely profitable and scalable, this paradigm is facing existential pressures in what is increasingly a "hyper-competitive environment". This modern competitive landscape is defined by several key characteristics that challenge the long-term viability of a purely services-based model. First, the rate of technological change is accelerating, with advancements in AI, cloud computing, and automation fundamentally altering how technology services are delivered and consumed. Second, the "knowledge intensity" of the global economy is increasing; clients are no longer just seeking cost savings but are demanding strategic partners who can drive innovation and digital transformation. The value is shifting from *doing* to *innovating*. Finally, the rise of AI and sophisticated automation platforms threatens to commoditise and eventually replace many of the lower-to-mid-level tasks that have been the bread and butter of the Indian IT services industry. In this new era, a business model predicated on linear growth—adding more people to generate more revenue—becomes inherently vulnerable. The very foundation of labour arbitrage is being eroded by technology, forcing a strategic re-evaluation of where future value will be created. The limits of the resource augmentation model are becoming increasingly apparent, necessitating a pivot towards non-linear, intellectual property (IP)-driven revenue streams.

2.3. The Product Gap: A Stark Contrast

Juxtaposed against the monumental success of the IT services industry is the stark reality of its underperformance in the global software product market. While India has produced legions of world-class software engineers, it has failed to birth a proportionate number of world-class software products. This "product gap" is the central paradox of the Indian IT story. The poignant observation by Infosys co-founder N. R. Narayana Murthy, that "there has not been a single invention from India in the last 60 years that became a household name globally," encapsulates this national-level innovation deficit. [34]

This is not merely an anecdotal observation; it is borne out by a quantitative analysis of the industry's structure. While projections suggest the Indian software product industry could reach a respectable US\$100 billion by 2025, this figure pales in comparison to the overall industry's revenue. It is largely propelled by a new generation of venture-backed startups like Zoho, Freshworks, and BrowserStack, rather than the established IT services behemoths. [9] An examination of the financial reports of the large IT majors reveals the almost negligible contribution of product-based revenues. A striking example can be found in Wipro's financial results for the fourth quarter of FY25. The company reported that its IT Products segment generated a mere ₹ 0.8 billion in revenue, against a total gross revenue of ₹ 225.0 billion for the same period. [43] This means that product sales accounted for less than 0.4% of the company's total revenue—a rounding error in the financial statements of a global technology giant. This single data point serves as a powerful and unequivocal confirmation of the user's core premise: the titans of Indian IT are fundamentally services companies, with product development existing, if at all, on the far periphery of their strategic and financial focus. This deep-seated structural bias towards services over products is the primary challenge that must be addressed.

2.4. Case Study: Infosys Finacle - The Exception that Proves the Rule

Amidst the general landscape of product underdevelopment, Infosys Finacle stands out as a significant and globally successful exception. Contrary to the initial query's suggestion of limited global reach, Finacle is, in fact, a dominant force in the global banking technology market. It has been consistently recognised by leading industry analyst firms such as Gartner, Forrester, and IDC as a leader in the core banking, digital banking processing, and payments platform spaces. [10] Financial institutions trust the platform in over 100 countries, and its solutions are integral to the banking operations of more than 1.7 billion people worldwide. Its client base spans large retail banks, corporate banking institutions, and small and medium-sized business (SMB) banking providers, demonstrating its broad market appeal and scalability. [10]

However, the success of Finacle does not invalidate the argument about the product gap within large Indian IT firms; rather, a closer examination of its operational structure provides a crucial clue to solving it. Finacle is not simply a product line within the broader Infosys services organisation. It operates as part of EdgeVerve Systems, a wholly-owned product subsidiary of Infosys. This structural separation is of paramount strategic importance. By housing Finacle within a distinct subsidiary, Infosys effectively created an insulated environment where a product-centric culture could flourish. This "Incubate and Insulate" model likely shielded the Finacle team from the dominant cultural and financial metrics of the parent services company. Within EdgeVerve, the key performance indicators could be aligned with long-term product roadmaps, market share growth, and R&D milestones, rather than the short-term pressures of quarterly revenue targets and employee billability rates that govern the services business. This separation allowed for the development of a specialised talent pool of product managers, architects, and domain experts focused solely on building, marketing, and selling a world-class product. Therefore, Finacle's success is not an anomaly that refutes the product deficit; it is a powerful case study that offers a viable blueprint for how other large IT services firms can overcome their internal inertia. Fostering genuine product innovation may require deliberate structural separation, creating protected enclaves where the distinct DNA of a product company can be cultivated and nurtured to maturity.

3. The Shifting Global Landscape: An External Factor Analysis

The historical dominance of the services model in Indian IT was not a strategic failing but a rational response to the prevailing global conditions of its time. However, the external environment is not static. A confluence of powerful technological, economic, political, and socio-cultural shifts is fun-

damentally altering the competitive landscape, creating a set of conditions that are uniquely favourable for India to pivot towards a product-centric strategy. This section provides an analysis of these external factors, arguing that the window of opportunity to make this strategic transition is now wide open.

3.1. Technological Disruption and Democratisation

The technological landscape of the 21st century is profoundly different from the one in which the Indian IT industry was forged. The historical moats of established Western technology giants, built upon proprietary hardware, expensive software licenses, and closed ecosystems, have been systematically eroded by a wave of democratisation. The advent of cloud computing platforms like AWS, Azure, and Google Cloud has obviated the need for massive upfront capital expenditure on computing infrastructure, allowing startups and established firms alike to access world-class, scalable resources on a pay-as-you-go basis. Similarly, the proliferation of open-source software, from operating systems like Linux to machine learning frameworks like TensorFlow and PyTorch, has provided a powerful, free-to-use foundation for building sophisticated applications.

This technological levelling of the playing field has neutralised many of the historical advantages held by incumbents. The key differentiator is no longer access to capital or proprietary technology, but access to talent. In this new paradigm, India finds itself in a position of unprecedented strength. The nation has emerged as a global leader in AI skill penetration, with its AI-skilled workforce having expanded by a remarkable 14 times since 2016. [39] This burgeoning talent pool, combined with the global accessibility of cutting-edge tools and platforms, means that for the first time, technological capability is no longer the primary constraint on India's ability to build globally competitive software products. The raw materials for innovation—human capital and advanced tools—are now abundantly available.

3.2. Economic Evolution: From Cost Arbitrage to Value Creation

The economic drivers of the global technology market are undergoing a parallel and equally significant transformation. For decades, the primary motivation for Western firms to engage with the Indian IT sector was cost arbitrage—the ability to get work done at a lower price point. While efficiency and cost-effectiveness remain important, they are no longer the sole, or even primary, determinants of strategic sourcing decisions. The global economy has moved firmly into the era of digital transformation, where technology is not just a support function but the central driver of business strategy, competitive advantage, and customer experience.

In this new economic context, clients are seeking partners who can deliver not just cost savings, but strategic value and

innovation. A recent NASSCOM study highlights this shift, noting a decisive pivot among global enterprises toward "AI-first" operations. [26] Businesses are fundamentally re-architecting their processes around AI to enhance decision-making, create new revenue streams, and build deeper customer relationships. This evolution in client demand creates a fertile ground for high-value software products that solve complex, domain-specific business problems. The traditional services model, optimised for delivering projects on time and on budget, is less suited to this new demand for co-innovation and strategic partnership. The market is now rewarding companies that can provide scalable, IP-led solutions that deliver transformative outcomes, opening a significant opportunity for Indian firms to move up the value chain by transitioning from service providers to product innovators.

3.3. Political and Legal Tailwinds: A Conducive Policy Ecosystem

A critical enabling factor for any major industrial transformation is a supportive policy environment. In India, the government has recognised the strategic importance of fostering a domestic software product ecosystem. It has implemented a series of policies that create significant tailwinds for a product-centric pivot. This proactive stance represents a major positive development in the "Political-Legal" dimension of the business environment.

At the forefront of these initiatives is the National Policy on Software Products (NPSP) 2019. This landmark policy explicitly articulates the vision to develop India as a global software product hub, setting ambitious targets of creating a US\$70-80 billion software product industry and nurturing 10,000 technology startups by 2025. [42] Crucially, the policy goes beyond mere vision statements, outlining concrete support mechanisms such as the creation of a dedicated Software Product Development Fund (SPDF) and the provision of grants for industry-academia R&D collaboration. [22]

The NPSP is complemented by broader flagship programs like Startup India and Make in India. The Startup India initiative has been instrumental in cultivating a vibrant entrepreneurial culture by offering a host of benefits, including tax exemptions, simplified compliance norms, and access to funding through mechanisms like the Fund of Funds for Startups and the Credit Guarantee Scheme. [31] Simultaneously, the push for self-reliance in the defence sector under the Aatmanirbhar Bharat mission has created a large, captive domestic market for high-technology products. Government initiatives like Innovations for Defence Excellence (iDEX) and the Technology Development Fund (TDF) are actively channelling funds towards private sector R&D for defence applications, particularly in areas like AI. [4] This confluence of targeted software product policies, broad entrepreneurial support, and a strategic push for indigenous technology creates a uniquely favourable regulatory and political landscape for Indian IT companies to invest in product development.

3.4. Socio-Cultural Maturation: The Rise of a Product Mindset

Perhaps the most profound shift has been socio-cultural. The Indian technology landscape is no longer solely defined by the large, established services companies. The last decade has witnessed the explosive growth and maturation of a dynamic startup ecosystem, which has fundamentally altered the cultural fabric of the industry. This has given rise to a new generation of entrepreneurs, engineers, and product managers who possess a "product-first" mindset, focusing on building scalable solutions for global audiences.

This cultural shift is backed by a rapidly maturing venture capital (VC) market. After a brief slowdown, VC funding in India demonstrated strong resilience, rebounding to US\$13.7 billion in 2024. Significantly, over US\$601 billion in funding for startups in fields like AI, semiconductors, and space technology signals a new phase of investor confidence in India's ability to produce high-tech IP. [11]

This burgeoning startup scene and the established IT majors should not be viewed as separate, competing ecosystems. Instead, they exist in a potentially powerful symbiotic relationship. The startup world is effectively acting as the nation's R&D lab and talent incubator for the product economy, cultivating the very risk-taking culture, agile methodologies, and product management expertise that the large IT firms have historically lacked. Conversely, the IT majors possess the immense capital reserves, established global sales channels, and enterprise-level credibility that startups desperately need to scale. This dynamic creates a clear strategic pathway: one of the most effective ways for the IT giants to accelerate their product pivot is not just to build from within, but to actively invest in, partner with, and acquire the most promising players from this vibrant startup ecosystem, thereby injecting much-needed product DNA directly into their organisations.

4. Internal Inertia: An Organisational Audit of the Indian IT Majors

While the external environment presents a compelling case for a strategic pivot, the transition from services to products is hindered by powerful forces of internal inertia within India's large IT corporations. These organisations have spent decades optimising every facet of their structure, culture, and financial models for the singular purpose of delivering services at scale. This highly specialised evolution has, as a side effect, created significant internal barriers to the agile, risk-tolerant, and long-term-oriented approach required for successful product innovation. An internal analysis, akin to an Internal Factors Analysis Summary (IFAS), reveals deep-seated weaknesses in culture, investment strategy, and talent management that must be addressed to unlock the sector's product potential.

4.1. The Culture Conundrum: Risk Aversion and the Tyranny of the Billable Hour

The corporate culture prevalent in most large Indian IT firms is a direct product of the services business model. It is a culture engineered for predictability, process adherence, and operational excellence. Key values include meticulous project management, strict quality control, and the maximisation of resource utilisation, often measured by the "billable hour." While this has been the bedrock of their success in delivering complex projects for global clients, it is a culture that is fundamentally antithetical to the chaotic, iterative, and failure-tolerant process of product innovation. [18]

Product development is an inherently risky venture. It involves making bets on uncertain market needs, investing significant resources upfront with no guarantee of a return, and embracing a cycle of rapid experimentation, failure, and learning. This clashes with a corporate DNA that has traditionally been risk-averse, preferring the steady, predictable revenue streams of long-term service contracts over the high-risk, high-reward nature of building a new product from the ground up. [2] Financial structures reinforce this risk aversion. The intense pressure from public markets to deliver consistent, predictable quarterly growth in revenue and operating margins discourages long-term, speculative investments in R&D and new product ventures. [17] A 2023 PwC survey, while noting a positive trend towards proactive risk-taking, found that a "safety first" ethos remains a key element of the organisational culture for half of all Indian firms surveyed. [16] This deep-seated cultural and financial orientation towards value protection and predictable execution creates a powerful gravitational pull that stifles the creative and experimental spirit essential for breakthrough product innovation.

4.2. The R&D Investment Deficit: A Quantitative Reality

The most tangible and irrefutable evidence of the services-first mindset is found in the financial statements of the IT majors: a chronic and severe underinvestment in Research and Development (R&D). Leadership in any technology product category is impossible without a sustained and significant commitment to R&D, as it is the primary engine for creating the intellectual property that underpins a product's competitive advantage. On this metric, the Indian IT sector lags dramatically behind its global peers.

Data from FY23 reveals a stark picture: TCS, Wipro, and Tech Mahindra each allocated less than 0.5% of their total revenue to R&D. While Infosys and HCL Technologies fared slightly better, their investment levels were still modest at 0.71% and 0.54% of revenue, respectively. [3] This stands in stark contrast to global technology leaders. Even a services-oriented peer like Accenture invested approximately 2% of its revenue (US\$1.3 billion) in R&D in the same period. [3] When compared to product-centric companies, the gap becomes a chasm. A comprehensive study by the Foundation for Advancing Science and Technology (FAST) India found that, on average, global software firms exhibit an R&D intensity—R&D expenditure as a percentage of revenue—that is 32 times higher than that of their Indian counterparts. [27] While a company like TCS may lead its Indian peers in absolute R&D spending (US\$292 million) and patent filings (654), these figures are dwarfed by global giants like IBM, which consistently outspends and out-patents the entire Indian cohort combined. [27] This R&D deficit is not just a line item on a balance sheet; it is a clear strategic choice that reflects a deep-seated institutional bias against the long-term, capital-intensive work of creating proprietary technology. It is the quantitative manifestation of the product paradox.

Table 2. Comparative R&D Spending of Indian IT Firms and Global Peers (FY23/24).

Company	Total Revenue (USD Mn, FY23/24)	R&D Spend (USD Mn)	R&D as % of Revenue
Indian Firms			
TCS	~30,180	292.0	~0.97% (incl. innovation)
Infosys	~18,000	~127.8	~0.71%
Wipro	~11,000	<55.0	<0.50%
HCL Tech	~13,300	~71.8	~0.54%
Global Peers			
Accenture	64,100	1,300.0	~2.03%
IBM	61,900	7,000.0+	~11.3%+
Microsoft	211,900	27,200.0	~12.8%

Company	Total Revenue (USD Mn, FY23/24)	R&D Spend (USD Mn)	R&D as % of Revenue
Shopify	5,600	1,500.0	~26.8%

Note: Data compiled from public financial reports. R&D spending figures are approximate and may vary based on accounting definitions. TCS figure includes innovation expenditure as per the source.

4.3. The Talent and Leadership Mismatch: A Scarcity of Product DNA

The third critical internal barrier is a mismatch in human capital. The skills and competencies that define a successful leader or professional in a services-centric organisation are fundamentally different from those required in a product-led company. The Indian IT sector has cultivated a world-class talent pool in project management, client relationship management, technical delivery, and quality assurance. However, it faces a severe deficit in the core competencies of product management: deep market analysis, user empathy and research, strategic product vision, data-driven prioritisation, and cross-functional leadership.

India is currently grappling with a record talent shortage, with a staggering 80% of employers reporting difficulty in filling roles, a challenge that is particularly acute in the IT sector. While the nation produces a vast number of STEM graduates, there is a recognised lack of top-tier talent capable of *leading* innovation in emerging technologies. [25] The demand for product managers (PMs) has undergone a seismic shift. The pre-2023 boom in hiring for generalist PM roles has ended, replaced by a demand for highly specialised individuals with deep technical expertise, particularly in AI and machine learning. [36] The large IT firms, with their armies of talented but services-oriented project managers, are structurally ill-equipped to meet this new, specialised demand.

This situation creates a difficult "Experience Paradox." The country lacks a deep bench of experienced senior product leaders precisely because it has historically had few large-scale product companies where such talent could be nurtured and developed. The IT majors find it difficult to pivot to products because they lack these experienced leaders. Yet, they cannot organically develop such leaders without first committing to building products at scale. This self-reinforcing cycle is a significant impediment to transformation. The only viable ways to break this paradox are to either import senior product talent from global product hubs or to acquire it by purchasing mature startups that have already cultivated strong product teams. This talent and leadership gap underscores that the pivot to products is not just a matter of financial investment but a profound challenge of human capital transformation.

5. A Strategic Blueprint for the Product Pivot

Overcoming decades of entrenched institutional inertia requires more than just a declaration of intent; it demands a deliberate, systematic, and multi-phased strategic transformation. For the large Indian IT firms, the path from service provider to product powerhouse cannot be a single leap but must be a structured journey. This blueprint outlines a plausible, four-phase strategy designed to systematically build, acquire, and cultivate product capabilities, leveraging the firm's existing strengths while mitigating the risks associated with such a fundamental shift in business model.

5.1. Phase 1: Cultivating Product Pockets - The "Incubate and Insulate" Model

The first and most critical step is to create a protected space for innovation to germinate, shielded from the overwhelming cultural and financial gravity of the core services business. The success of Infosys Finacle, operating under the semi-autonomous umbrella of its subsidiary EdgeVerve Systems, provides the ideal template for this "Incubate and Insulate" model.

The strategy involves the creation of dedicated product divisions, internal incubators, or wholly-owned subsidiaries with a singular focus on product development. These entities must be granted a significant degree of operational autonomy. They need their own, separate Profit and Loss (P&L) responsibility, allowing them to be managed with a long-term perspective. Their Key Performance Indicators (KPIs) must be radically different from the services business, focusing on metrics like market adoption, user engagement, customer satisfaction, and long-term strategic value rather than short-term quarterly revenue and employee billability rates.

This structural insulation is crucial for fostering a distinct, product-centric culture. It allows these "product pockets" to attract and retain a different kind of talent—individuals who thrive on creativity, experimentation, and customer-centric problem-solving. By ring-fencing these units, the parent company can provide them with the two things they need most: patient capital and strategic guidance, while protecting them from the bureaucratic processes, risk-averse decision-making, and short-term financial pressures that would otherwise stifle their growth. This approach allows the organisation to begin building its product muscle in a controlled environment,

generating early wins and creating internal exemplars of success that can be scaled over time.

5.2. Phase 2: Strategic Capital Allocation - Building and Buying Innovation

Indian IT majors possess a formidable strategic asset: strong balance sheets and significant free cash flow generated by their stable and profitable services businesses. [38] This financial firepower must be strategically deployed to accelerate the product pivot through a dual-pronged investment strategy that combines internal development with external acquisition.

The first prong is a sophisticated Mergers and Acquisitions (M&A) strategy. The goal should be to acquire promising mid-to-late-stage product startups systematically. The primary objective of these acquisitions should not be merely to obtain a piece of technology or a new revenue stream, but to acquire intact, high-performing product teams. This is the most direct solution to the "Experience Paradox" identified earlier. By acquiring a company, the IT major instantly injects proven product leadership, experienced engineers, and an established product-market fit into its portfolio. These acquired teams can then serve as catalysts for cultural change within the broader organisation.

The second prong is the establishment of dedicated Corporate Venture Capital (CVC) arms. By making early-stage investments in a portfolio of deep-tech startups, the IT majors can gain a crucial window into emerging technologies, market trends, and disruptive business models. This approach, which aligns with the increasing activity of corporate VCs in the Indian market, serves multiple strategic purposes. [37] It provides a pipeline of potential future acquisition targets, fosters relationships with the innovation ecosystem. It allows the company to learn and adapt without bearing the full risk of internal development for every new idea. This build-and-buy approach allows the firm to de-risk its innovation strategy, balancing long-term internal R&D with the agility and market validation provided by the external startup ecosystem.

5.3. Phase 3: Reimagining the Talent Engine - Reskill, Recruit, Retain

A product-led organisation is built on a foundation of product-centric talent. The transition requires a complete overhaul of the existing human capital engine, moving beyond the traditional focus on scaling technical delivery skills to a new emphasis on cultivating product and innovation competencies. This transformation rests on three pillars: reskilling, recruiting, and retaining.

First, Reskill. The IT majors must launch massive, structured, and continuous upskilling programs. This involves identifying high-potential individuals within their existing workforce—project managers with strong domain knowledge, architects with a strategic mindset, and engineers with a passion for user experience—and providing them with rigorous training in

the core disciplines of product management, data science, and user-centric design. This trend is already underway, with reports indicating that nearly 50% of Indian tech professionals are now receiving some form of AI training at their workplaces. [24] However, these efforts need to be formalised, scaled, and integrated into clear career progression paths.

Second, Recruit. Internal reskilling alone will not be sufficient to bridge the experience gap. Firms must aggressively and strategically recruit senior product leaders, experienced designers, and deep-tech specialists (including PhDs) from global product hubs. This requires a willingness to compete for top-tier global talent, which may necessitate a significant shift in compensation structures, offering more equity-based incentives and creating a more empowering and less hierarchical work environment than is traditionally found in the Indian IT services sector.

Third, Retain. Attracting top talent is futile if the organisational environment drives them away. The IT majors must confront and address the long-standing cultural issues of excessive hierarchy, poor work-life balance, and workplace toxicity that are often cited as major pain points. [2] Creating clear and rewarding career paths for product-focused roles is essential. Incentive structures must be redesigned to reward innovation, calculated risk-taking, and successful product launches, not just the successful delivery of service-level agreements. This holistic approach to talent management is non-negotiable for building a sustainable product organisation.

5.4. Phase 4: Forging an Innovation Ecosystem - Beyond the Corporate Walls

The final phase of the strategy involves shifting from a closed, inwardly focused model of innovation to an open one that actively engages with the broader ecosystem. The complex challenges of deep-tech product development cannot be solved in isolation. IT firms must become central nodes in a vibrant network of innovation, collaborating with academia, government, and the startup community.

A key component of this is deepening partnerships with premier academic institutions, such as the Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc). This goes beyond simple campus recruitment to encompass joint R&D projects, the establishment of endowed research chairs, and the creation of shared innovation labs. Such collaborations, which are actively encouraged by government policies like the NPSP, can provide a vital infusion of fundamental research and next-generation talent into the corporate R&D pipeline. [42]

Furthermore, firms must proactively engage with and leverage the extensive support infrastructure created by the government. This means actively participating in programs like the National Policy on Software Products, applying for R&D grants, and using platforms like iDEX to co-develop solutions for the defence sector. [42] By positioning themselves as key partners to both academia and government,

Indian IT firms can amplify their own R&D efforts, access public funding, and align their product strategies with national priorities. This open innovation approach transforms the company from a solitary actor into the orchestrator of a powerful, collaborative ecosystem, significantly increasing its capacity for breakthrough innovation.

6. High-Opportunity Frontiers: Deep Tech Product Plays for Global Markets

The strategic pivot from services to products requires not

only a new operational blueprint but also a clear vision of where to compete. The most promising opportunities for Indian IT firms lie not in replicating existing consumer applications or enterprise software, but in leveraging their deep engineering talent to build products in complex, high-value, deep-technology domains. These are areas where technological sophistication, data mastery, and domain expertise are the primary differentiators. This section explores four such high-opportunity frontiers, providing the theoretical context, market analysis, and concrete product concepts that could form the basis of a globally competitive product portfolio.

Table 3. High-Growth Deep Tech Domains and Global Market Projections for Indian IT Innovations.

Deep Tech Domain	Key Application Areas	Global Market Size (2025 Est.)	Projected Global Market Size (2032 Est.)	Projected CAGR (%)
Deep Reinforcement Learning	Industrial Automation, Robotics, Supply Chain	US\$48.0 Billion (ML Market)	US\$309.7 Billion (ML Market)	30.5% (ML Market)
AI & Blockchain Synergy	Supply Chain Finance, Healthcare, Decentralized ID	US\$680.9 Million	US\$4,338.7 Million (by 2034)	22.9%
AI in Cybersecurity	Threat Intelligence, IoT Security, Fraud Detection	US\$30.5 Billion	US\$219.5 Billion (by 2034)	24.1%

Note: Market data is synthesised from multiple sources with varying methodologies and forecast periods. [6] The DRL market is a subset of the broader Machine Learning (ML) market, for which more robust data is available. CAGR reflects the forecast period specific to each report.

6.1. Industrial Intelligence: The Deep Reinforcement Learning (DRL) Opportunity

Theoretical Background: Deep Reinforcement Learning (DRL) represents a cutting-edge frontier in Artificial Intelligence. It combines the trial-and-error learning paradigm of reinforcement learning with the pattern-recognition power of deep neural networks. In a DRL system, an autonomous "agent" learns to make an optimal sequence of decisions by interacting with a complex, dynamic environment to maximise a cumulative reward. Unlike supervised learning, which requires vast amounts of pre-labelled data, DRL can learn optimal strategies in environments where explicit programming is impossible and labelled data is scarce. This makes it exceptionally well-suited for optimising real-world industrial processes, from robotics to supply chain management and energy systems. [33]

Market Analysis: The market for reinforcement learning is poised for explosive growth, driven by the increasing need for automation and optimisation across industries. While specific market sizing for RL is emerging, it is a key component of the broader Machine Learning (ML) market, which was valued at

US\$35.32 billion in 2024 and is projected to skyrocket to US\$309.68 billion by 2032, exhibiting a compound annual growth rate (CAGR) of 30.5%. [32] More focused reports on the RL market project growth from the US\$2.8 billion in 2022 to US\$88.7 billion by 2032, a CAGR of 41.5%. [32] North America currently dominates the market, but the Asia-Pacific region is expected to witness the fastest growth, presenting a significant opportunity for Indian firms. [32] Key application verticals include manufacturing, robotics, logistics, and energy management.

Potential Product Applications:

- 1) "Opti-Chain": A cloud-native SaaS platform designed for dynamic, end-to-end supply chain optimisation. Traditional supply chain software relies on historical data and static models for forecasting. "Opti-Chain" would utilise a DRL agent to learn and adapt in real-time continuously. It would ingest live data streams (e.g., weather patterns, shipping delays, demand spikes, commodity price changes) and autonomously make decisions to re-route shipments, adjust inventory levels across warehouses, and modify production schedules to minimise costs and disruptions. This moves beyond passive forecasting to active, intelligent management.
- 2) "Robo-Teach": A software platform aimed at dramati-

cally reducing the time and expertise required to program industrial robots for complex tasks. Currently, programming a robotic arm for a new assembly or pick-and-place task can take weeks of expert-level coding. "Robo-Teach" would use DRL in a simulated environment (a "digital twin" of the factory floor) to allow the robot to learn the optimal movements and grips through millions of virtual trials. This learned policy could then be transferred to the physical robot, enabling rapid deployment and increased flexibility for high-mix, low-volume manufacturing environments.

- 3) "Grid-Balance": An AI-powered energy management product for industrial plants, commercial buildings, and microgrid operators. The DRL agent would learn to optimise energy consumption by intelligently scheduling the operation of high-load equipment (like HVAC systems or industrial furnaces), managing on-site energy storage (batteries), and deciding when to draw power from the grid versus using on-site renewable generation. By learning to predict demand patterns and real-time energy pricing, the system would significantly reduce energy costs and improve grid stability. [5]

6.2. Building Trust in a Digital World: The AI and Blockchain Synergy

Theoretical Background: The convergence of Artificial Intelligence and Blockchain technology creates a powerful synergy that addresses two of the most critical challenges in the digital economy: trust and intelligence. Blockchain, at its core, is a trust machine. It provides a decentralised, cryptographically secure, and immutable ledger, ensuring that data, once recorded, cannot be altered or tampered with. This creates a single, verifiable source of truth. AI, on the other hand, is an intelligence engine. It excels at analysing vast datasets to uncover patterns, make predictions, and automate complex decisions. When combined, Blockchain provides AI algorithms with a high-integrity, trusted dataset to learn from, while AI can enhance blockchain operations through intelligent automation of smart contracts and analysis of on-chain activity. [8]

Market Analysis: The global market for integrated Blockchain AI solutions is rapidly emerging and projected to see substantial growth. Forecasts indicate the market will grow from approximately US\$680.89 million in 2025 to over US\$4.33 billion by 2034, registering a CAGR of around 22.93%. [44] Other, more bullish estimates project the market could reach US\$335.8 billion by 2030, with a CAGR of 58.9%. [19] The rising demand for enhanced data security, transparency, and automation across key industries drives this growth. The Banking, Financial Services, and Insurance (BFSI) sector is a leading adopter, followed closely by logistics and supply chain management, and healthcare, all of which are plagued by issues of fraud, inefficiency, and data silos. [7]

Potential Product Applications:

- 1) "Veri-Creds": A decentralised identity and verifiable credentials platform. In the current digital world, identity is fragmented and controlled by centralised entities. "Veri-Creds" would empower individuals and organisations to own and control their own digital identities. Using a blockchain would allow institutions (universities, employers, governments) to issue tamper-proof digital credentials (e.g., degrees, work permits, certifications) that are stored in a user's digital wallet. AI would be used for advanced biometric verification during identity creation and for intelligent, privacy-preserving verification processes, enabling frictionless and highly secure KYC processes for banking, background checks, and access control.
- 2) "Pharma-Trace": An end-to-end pharmaceutical supply chain integrity platform. The global pharmaceutical industry loses billions to counterfeit drugs, which pose a severe risk to public health. "Pharma-Trace" would use blockchain to create an immutable record of a drug's journey from the manufacturing plant to the pharmacy shelf. Each transaction and change of custody would be recorded on the chain. AI algorithms would then continuously analyse this supply chain data to detect anomalies, predict potential shortages, identify diversion points, and ensure compliance with regulations like the Drug Supply Chain Security Act (DSCSA), thereby guaranteeing drug authenticity and safety. [28]
- 3) "Trade-Flow": A next-generation supply chain finance platform. Small and medium-sized suppliers often face crippling cash flow issues due to long payment cycles. "Trade-Flow" would use a blockchain to create a transparent, shared view of the supply chain for the buyer, supplier, and financier. IoT sensors would track goods in transit, with their data recorded on the blockchain. A smart contract would automatically trigger financing or final payment to the supplier as soon as the system verifies that goods have been delivered and accepted. AI models would be used to perform real-time risk assessment on transactions, dynamically price the cost of financing, and predict potential defaults, making trade finance more accessible and efficient.

6.3. Proactive Defence: AI and Blockchain in Next-Generation Cybersecurity

Theoretical Background: The cybersecurity landscape is an escalating arms race between attackers and defenders. Traditional, signature-based security tools are increasingly ineffective against sophisticated, novel attacks. The convergence of AI and Blockchain offers a new, proactive paradigm for cyber defence. AI, particularly machine learning, can be used to analyse massive volumes of network traffic and endpoint data in real-time to detect anomalous patterns that signify a potential breach, moving from reactive defence to predictive

threat hunting. [28] Blockchain technology provides a decentralised and tamper-proof infrastructure that can revolutionise areas like identity and access management, secure sharing of threat intelligence, and the security of Internet of Things (IoT) ecosystems by eliminating single points of failure. [1]

Market Analysis: The market for AI in Cybersecurity is experiencing explosive growth as organisations grapple with an ever-increasing volume and sophistication of cyber threats. The market was valued at US\$25.4 billion in 2024 and is projected to surge to US\$219.53 billion by 2034, growing at a robust CAGR of 24.1%. [29] Another report projects the market reaching US\$60.6 billion by 2028 from a 2023 value of US\$22.4 billion (CAGR 21.9%). [35] This demand is fuelled by the proliferation of connected devices (IoT), the shift to cloud computing, and the rise of AI-powered cyberattacks. In India, the demand for AI-skilled cybersecurity professionals dramatically outstrips the available supply, creating a significant market opportunity for scalable, product-based solutions. [20]

Potential Product Applications:

- 1) "Sentinel-AI": A collaborative threat intelligence platform. Currently, organisations often operate in silos when it comes to cyber threats. "Sentinel-AI" would create a consortium-based model where members can securely and anonymously share threat intelligence. AI (specifically Natural Language Processing) would be used to automatically ingest and analyse unstructured threat data from a multitude of sources, including dark web forums, security blogs, and malware analysis reports. The verified threat indicators would then be recorded on a private blockchain, creating a shared, immutable, and real-time ledger of threats that all members can use to update their defence systems automatically.
- 2) "IoT-Guard": A comprehensive security solution for industrial and smart-home IoT deployments. IoT devices are notoriously insecure and create a massive attack surface. "IoT-Guard" would address this at a fundamental level. It would use a blockchain-based public key infrastructure (PKI) to assign a unique, tamper-proof digital identity to every device at the time of manufacture. This would be used for secure authentication and encrypted communication, preventing unauthorised devices from joining the network. On top of this, lightweight AI agents deployed on network gateways would continuously monitor the behaviour of each device, creating a baseline of normal activity and instantly detecting and isolating any device that behaves anomalously, thereby containing threats before they can spread. [41]
- 3) "De-Phish": An advanced anti-phishing and fraud detection product. This solution would use a combination of AI techniques. Computer vision models would analyse the visual layout of emails and login pages to detect

subtle signs of spoofing. NLP models would analyse the text for linguistic cues associated with phishing attacks (e.g., urgency, unusual requests). The system would also leverage a blockchain-based reputation ledger, where domains and email senders are scored based on their historical behaviour across a wide network of users, allowing for more accurate and rapid identification of malicious actors.

6.4. The Sovereign Tech Imperative: AI Integration in Indian Defence

Theoretical Background: The character of modern warfare is being fundamentally redefined by technology, with Artificial Intelligence emerging as a critical determinant of military superiority. The effective integration of AI into defence platforms and systems provides a decisive advantage in what is known as the OODA loop (Observe, Orient, Decide, Act). AI enables superior situational awareness through the rapid fusion and analysis of sensor data, facilitates faster and more accurate decision-making in command and control, and powers the development of autonomous systems, from drones to ground vehicles. For India, developing sovereign AI capabilities in defence is not just a matter of modernisation but a strategic imperative for national security and autonomy. [13]

Market Analysis: India's defence sector is in the midst of a historic transformation, driven by the government's 'Make in India' and Aatmanirbhar Bharat (self-reliant India) initiatives. This has created an unprecedented opportunity for the domestic private sector. Defence production reached a record ₹ 1.27 lakh crore (approx. US\$15 billion) in FY24, while defence exports surged to ₹ 21,083 crore (approx. US\$2.5 billion), a staggering 30-fold increase over the past decade. [21] The government is actively fostering this ecosystem, reserving 75% of its capital procurement budget for domestic sources and launching over 75 specific AI projects for the armed forces. [14] This creates a large, well-funded, and accessible domestic market for Indian technology companies. Leading private firms like Tata Advanced Systems Limited (TASL) are already deeply integrated into the manufacturing of advanced platforms like fighter jets and missile launchers, demonstrating the private sector's growing capability. [12]

Potential Product Applications:

- 1) "C4ISTAR-AI Suite": A modular software product suite for modernising military Command, Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition, and Reconnaissance (C4ISTAR) systems. Rather than a single monolithic system, this would be a collection of interoperable AI modules that can be integrated with existing military hardware (radars, satellites, drones, sensors). Modules would include an AI-powered data fusion engine to create a unified operational picture, a predictive analytics module to anticipate enemy movements, and a target recognition module that uses computer vision to identify and classify threats from video feeds

automatically. Case studies confirm that such systems are already being deployed along India's borders, indicating a clear and present demand. [14]

- 2) "Aero-Predict": A predictive maintenance platform specifically designed for high-value military assets like fighter aircraft, naval warships, and armoured vehicles. These platforms are incredibly complex and costly to maintain. "Aero-Predict" would use AI and machine learning models to continuously analyse real-time sensor data, flight logs, and maintenance records to predict component failures before they occur. This would allow the armed forces to shift from a fixed, schedule-based maintenance cycle to a more efficient, condition-based one, dramatically increasing asset availability ("uptime"), reducing lifecycle costs, and enhancing mission readiness. [15]
- 3) "Swarm-Commander": An AI-powered command and control software for operating swarms of autonomous drones. The future of aerial warfare involves the coordinated action of large numbers of unmanned systems. "Swarm-Commander" would be the intelligent "brain" that allows a single human operator to manage a swarm for complex missions like wide-area surveillance, electronic warfare, or coordinated strikes. The AI would handle the low-level tasks of collision avoidance, formation flying, and autonomous target allocation based on the operator's high-level commands. Given that the Indian Army has already demonstrated capabilities in this area, a robust, scalable product would have significant domestic and export potential. [23]

7. Conclusion: Evolving from Service Provider to Strategic Innovator

The Indian IT sector stands at a pivotal moment in its history. The confluence of global technological maturation, a highly favourable domestic policy environment, and the rise of a vibrant and innovative startup ecosystem has created an unprecedented window of opportunity. The long-standing paradox—of being a global services leader yet a product laggard—can now be decisively addressed. The journey from a business model predicated on deploying human capital to one centred on creating and monetising intellectual property is undoubtedly challenging, fraught with cultural, financial, and strategic hurdles. The deep-seated inertia of the services-oriented model, with its focus on quarterly predictability and risk minimisation, cannot be underestimated.

However, the path forward is clear. It requires a bold and deliberate strategic pivot, as outlined in this report. This transformation must be built on a multi-pronged approach: incubating and insulating internal product divisions to foster innovation; strategically deploying capital to acquire both technology and talent from the dynamic startup ecosystem; fundamentally reimagining human capital strategies to build a new generation

of product leaders; and forging an open innovation ecosystem in partnership with academia and government. The potential rewards for successfully navigating this transition are immense. The high-opportunity frontiers in deep tech—from industrial intelligence and AI-blockchain synergies to next-generation cybersecurity and sovereign defence technologies—represent vast, high-growth global markets where India's deep engineering talent can establish a formidable competitive advantage.

Ultimately, this pivot is more than just a corporate strategy for the next decade; it is a national economic imperative. The long-term sustainability and relevance of the Indian IT sector depend on its ability to move up the global value chain. Evolving from a world-class provider of skilled labour to a world-class creator of intellectual property will not only secure the industry's future. Still, it will also redefine India's role in the global technology landscape. It is the final, crucial step in cementing the nation's position as a true, end-to-end digital powerhouse, capable not only of executing the world's technological vision but of authoring it.

Abbreviations

AI	Artificial Intelligence
BFSI	Banking, Financial Services, and Insurance
BPM	Business Process Management
C4ISTAR	Command, Control, Communications, Computer Intelligence, Surveillance, Target Acquisition, and Reconnaissance
CAGR	Compounded Annual Growth Rate
CVC	Corporate Venture Capital
DNA	Deoxyribonucleic Acid
DRL	Deep Reinforcement Learning
DSCSA	Drug Supply Chain Security Act
FAST	Foundation for Advancing Science and Technology
FDI	Foreign Direct Investment
FY	Financial Year
GDP	Gross Domestic Product
HCL	Hindustan Computers Limited
HVAC	Heating, Ventilation, and Air Conditioning
ID	Identification
iDEX	Innovations for Defense Excellence
IFAS	Internal Factor Analysis Summary
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
IoT	Internet of Things
IP	Intellectual Property
IT	Information Technology
KPI	Key Performance Indicator
KYC	Know Your Customer
M&A	Merger and Acquisition
ML	Machine Learning
NASSCOM	National Association for Software and Services Companies
NLP	Natural Language Processing

NPSP	National Policy on Software Products
OODA	Observe, Orient, Decide, Act
P&L	Profit and Loss
PhD	Doctor of Philosophy
PKI	Public Key Infrastructure
PM	Product Manager
PwC	Price Waterhouse Cooper
R&D	Research and Development
SMB	Small and Medium-sized Business
TASL	Tata Advanced Systems Limited
TCS	Tata Consultancy Services
TDF	Technology Development Fund
US\$	United States of America Dollar
VC	Venture Capital

Author Contributions

Partha Majumdar is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Afzal, A., & Rahman, N. (2020, December 31). The Convergence of AI, Blockchain, and IoT for Next-Gen Information Security Solutions. Retrieved September 13, 2025, from https://www.researchgate.net/publication/389600935_The_Convergence_of_AI_Blockchain_and_IoT_for_Next-Gen_Information_Security_Solutions
- [2] Bhattacharya, A. (2022, July 21). India Inc is finally realising that workplace culture matters. Retrieved September 13, 2025, from <https://qz.com/india/1054786/indian-inc-is-finally-realising-the-workplace-culture-matters>
- [3] Centre for Development of Telematics (2023, December 6). Indian IT giants slash R&D spending to boost profitability. Retrieved September 13, 2025, from <https://www.communicationstoday.co.in/indian-it-giants-slash-rd-spending-to-boost-profitability/>
- [4] Defence Scientific Information & Documentation Centre (2025, March 21). DRDO initiates new policies to help private sector develop futuristic military technologies. Retrieved September 13, 2025, from <https://drdo.gov.in/drdo/sites/default/files/drdo-news-documents/NPC22to24Mar2025.pdf>
- [5] Farooq, A., & Iqbal, K. (2025, February 13). A Survey of Reinforcement Learning for Optimization in Automation. Retrieved September 13, 2025, from <https://arxiv.org/html/2502.09417v1>
- [6] Fortune Business Insights (2025, August 25). Machine Learning (ML) Market Size, Share & Industry Analysis, By Enterprise Type (Small & Mid-sized Enterprises (SMEs) and Large Enterprises), By Deployment (Cloud and On-premise), By End-Use Industry (Healthcare, Retail, IT and Telecommunication, BFSI, Automotive and Transportation, Advertising and Media, Manufacturing, and Others), and Regional Forecast, 2025-2032 Source: <https://www.Fortunebusinessinsights.Com/machine-learning-market-102226>. Retrieved September 13, 2025.
- [7] GMI Research (2023, October 31). Blockchain AI Market Size, Share, Growth & Analysis Report 2023-2030. Retrieved September 13, 2025, from <https://www.gmiresearch.com/report/blockchain-ai-market-analysis-industry-research/>
- [8] Gu, S., Holly, E., Lillicrap, T., & Levine, S. (2016, November 23). Deep Reinforcement Learning for Robotic Manipulation with Asynchronous Off-Policy Updates. Retrieved September 13, 2025, from <https://arxiv.org/abs/1610.00633>
- [9] India Brand Equity Foundation (IBEF) (2025, August 31). IT & BPM Industry in India. Retrieved September 13, 2025, from <https://www.ibef.org/industry/information-technology-india>
- [10] Infosys Finacle (2025). Latest Analyst Ratings. Retrieved September 13, 2025, from <https://www.finacle.com/insights/analyst-rating/>
- [11] Jain, A. (2025, September 3). India, US VCs Bet Big on Deep Tech With \$1Bn for Indian Start-Ups. Retrieved September 13, 2025, from <https://www.outlookbusiness.com/start-up/news/india-us-vcs-bet-big-on-deep-tech-with-1bn-fund-for-indian-start-ups>
- [12] Jayakumar, P. B. (2025, March 3). India's defence sector is transforming as the private sector storms in, driving modernisation. Retrieved September 13, 2025, from <https://www.fortuneindia.com/long-reads/indias-defence-sector-is-transforming-as-the-private-sector-storms-in-driving-modernisation/120602>
- [13] Khan, B. U. I., Goh, K. W., Khan, A. R., Zuhairi, M. F., & Chaimanee, M. (2024, August 27). Integrating AI and Blockchain for Enhanced Data Security in IoT-Driven Smart Cities. Retrieved September 13, 2025, from <https://www.mdpi.com/2227-9717/12/9/1825>
- [14] Kharat, G., Jagtap, S., Yelikar, B., & Mulik, S. S. (2025, July 31). Applications of Artificial Intelligence in Indian Defence Forces: A Literature Review. Retrieved September 13, 2025, from https://www.researchgate.net/publication/393637532_Applications_of_Artificial_Intelligence_in_Indian_Defence_Forces_A_Literature_Review
- [15] KPMG (2025, June 23). Artificial Intelligence (AI) in Defence Modernisation. Retrieved September 13, 2025, from <https://kpmg.com/in/en/blogs/2025/06/artificial-intelligence-in-defence-modernisation.html>
- [16] Krishnan, S. (n.d.). PwC's Global Risk Survey 2023 - India Highlights: From threat to opportunity. Retrieved September 13, 2025, from <https://www.pwc.in/consulting/risk-consulting/pwcs-global-risk-survey-2023-india-highlights.html>

- [17] Kumar, N. (2025, July 25). TCS vs Infosys vs Wipro vs HCL Tech: Hiring plans, salary hikes, guidance— Is the worst over for IT stocks? Retrieved September 13, 2025, from <https://www.livemint.com/market/stock-market-news/tcs-vs-infosys-vs-wipro-vs-hcl-tech-hiring-plans-salary-hikes-guidance-is-the-worst-over-for-it-stocks-11753352175709.html>
- [18] Kumari, N. (2021, March 30). Studying the Dimensions of Corporate Culture in Indian IT Companies. Retrieved September 13, 2025, from https://www.researchgate.net/publication/349956753_Studying_the_Dimensions_of_Corporate_Culture_in_Indian_IT_Companies
- [19] Luther, M. (2025, May 10). Top Use Cases of Blockchain AI Development in 2025. Retrieved September 13, 2025, from <https://community.nasscom.in/communities/ai/top-use-cases-blockchain-ai-development-2025>
- [20] Markets and Markets (2023, December 31). Artificial Intelligence in Cybersecurity Market Share, Forecast | Growth Analysis & Opportunities. Retrieved September 13, 2025, from <https://www.marketsandmarkets.com/Market-Reports/artificial-intelligence-ai-cyber-security-market-220634996.html>
- [21] Ministry of Defence (2025, March 24). Make in India Powers Defence Growth. Retrieved September 13, 2025, from <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2114546>
- [22] Ministry of Electronics and Information Technology (MEITY) (2019). National Policy on Software Products (2019). Retrieved September 13, 2025, from https://www.meity.gov.in/static/uploads/2024/02/national_policy_on_software_products-2019.pdf
- [23] Mohiuddin, M. A. (2024, September 30). AI-Driven Tools in the Indian Defense Sector. Retrieved September 13, 2025, from <https://indiaai.gov.in/article/ai-driven-tools-in-the-indian-defense-sector>
- [24] Moorthy, K. (2025, June 24). Half of India's Tech Workforce Embraces AI Training Trend. Retrieved September 13, 2025, from <https://community.nasscom.in/communities/ai/half-indias-tech-workforce-embraces-ai-training-trend>
- [25] Muneer, M. (2025, February 28). India's skill gap crisis: Plenty of graduates, not enough leaders for emerging tech. Retrieved September 13, 2025, from <https://economictimes.indiatimes.com/opinion/et-commentary/indias-skill-gap-crisis-plenty-of-graduates-not-enough-leaders-for-emerging-tech/articleshow/118635259.cms?from=mdr>
- [26] NASSCOM (2025). Digital Enterprise 2025: Advancing to an AI-First Enterprise. Retrieved September 13, 2025, from <https://nasscom.in/knowledge-center/publications/digital-enterprise-2025-advancing-ai-first-enterprise>
- [27] Nautiyal, V., Kaur, H., Thukral, A., Koli, A., & Kiran, Y. (2024). State of Industry R&D in India. Retrieved September 13, 2025, from https://www.fast-india.org/wp-content/uploads/2024/09/Software_Sector_Brief.pdf
- [28] Owen, A., & Dibblings, P. (2025, January 31). Blockchain and AI for Supply Chain Management in Healthcare: Ensuring Transparency and Accountability. Retrieved September 13, 2025, from https://www.researchgate.net/publication/391295974_Blockchain_and_AI_for_Supply_Chain_Management_in_Healthcare_Ensuring_Transparency_and_Accountability
- [29] Polaris Market Research & Consulting, Inc. (2025, August 31). AI in Cybersecurity Market Size, Share, Trends, Industry Analysis Report: By Type, Application, Technology, Offering (Hardware, Software, and Services), Vertical, and Region (North America, Europe, Asia Pacific, Latin America, and Middle East & Africa) – Market Forecast, 2025-2034. Retrieved September 13, 2025, from <https://www.polarismarketresearch.com/industry-analysis/ai-in-cybersecurity-market>
- [30] Press Information Bureau (2025, March 27). India's Information Technology (IT) Industry Registers Significant Growth in Last Decade: Projected to Reach Rs. 24, 29, 838 crore (US\$ 283 billion) in FY25. Retrieved September 13, 2025, from <https://www.ibef.org/news/india-s-information-technology-it-industry-registers-significant-growth-in-last-decade-projected-to-reach-rs-24-29-838-crore-us-283-billion-in-fy25>
- [31] Press Trust of India (PTI) (2025). Government initiatives for IT industry in India. Retrieved September 13, 2025, from <https://www.ptiwebtech.com/blogs/news/government-initiatives-for-it-industry-in-india>
- [32] Priyadarshi, A., Pandey, A., & Sumant, O. (2023, September 30). Reinforcement Learning Market Size, Share, Competitive Landscape and Trend Analysis Report, by Deployment Mode (On-premise, Cloud), by Enterprise Size (Large Enterprise, Small and Medium-sized Enterprise), by End User (BFSI, IT and Telecom, Retail and E-commerce, Healthcare, Government, Automotive, Others): Global Opportunity Analysis and Industry Forecast, 2022 - 2032. Retrieved September 13, 2025, from <https://www.alliedmarketresearch.com/reinforcement-learning-market-A229407>
- [33] Raj, A. (2025, September 4). Reinforcement Learning in Real-World Industrial Applications. Retrieved September 13, 2025, from https://www.researchgate.net/publication/391371025_Reinforcement_Learning_in_Real-World_Industrial_Applications
- [34] Ranjan, A. (2019, June 21). Paving the road for world-beating software products from India. Retrieved September 13, 2025, from <https://foundingfuel.com/article/paving-the-road-for-worldbeating-software-products-from-india/>
- [35] Reshi, I. A., & Sholla, S. (2024, May 31). Leveraging AI and Blockchain for Enhanced IoT Cybersecurity. Retrieved September 13, 2025, from https://www.researchgate.net/publication/380705168_Leveraging_AI_and_Blockchain_for_Enhanced_IoT_Cybersecurity

- [36] Sanjay, T. (2025, August 18). How Product Managers in India's Tech Ecosystem Are Grappling With AI. Retrieved September 13, 2025, from <https://www.outlookbusiness.com/start-up/how-product-managers-in-indias-tech-ecosystem-are-grappling-with-ai>
- [37] Sheth, A., Krishnan, S., Addepalli, P. K., Muralidhar, A., & Arya, P. (2025). India Venture Capital Report 2025. Retrieved September 13, 2025, from <https://www.bain.com/insights/india-venture-capital-report-2025/>
- [38] Tata Consultancy Services (TCS) (2025, April 10). TCS Crosses \$30 Billion Revenue Milestone, Strong Order Book Reinforces Confidence in Long-Term Resilience. Retrieved September 13, 2025, from <https://www.tcs.com/who-we-are/newsroom/press-release/tcs-financial-results-q4-fy-2025>
- [39] Tiwari, P. (2025, September 5). SAS launches Academy for Data & AI Excellence in India to help bridge the country's growing AI skills gap. Retrieved September 13, 2025, from <https://timesofindia.indiatimes.com/business/sas-launches-academy-for-data-ai-excellence-in-india-to-help-bridge-the-country-s-growing-ai-skills-gap/articleshow/123719685.cms>
- [40] TOI Tech Desk (2024, October 16). Most valuable tech companies in India by market cap 2024: Tata Consultancy services, Infosys, and more. Retrieved September 13, 2025, from <https://timesofindia.indiatimes.com/technology/tech-news/most-valuable-tech-companies-in-india-by-market-cap-2024-tata-consultancy-services-infosys-and-more/articleshow/114195650.cms>
- [41] TOI Tech Desk (2025, September 4). IT jobs slowdown: Sector sees 10% dip as legacy tech openings slump to 3-year low; AI, cybersecurity hiring bucks the trend. Retrieved September 13, 2025, from <https://timesofindia.indiatimes.com/business/india-business/it-jobs-slowdown-sector-sees-10-dip-as-legacy-tech-openings-slump-to-3-year-low-ai-cybersecurity-hiring-bucks-the-trend/articleshow/123691264.cms>
- [42] Viji (2020, March 1). National Policy on Software Products 2019. Retrieved September 13, 2025, from <https://egovernance.vikaspedia.in/viewcontent/e-governance/digital-india/national-policy-on-software-products-2019?lgn=en>
- [43] Wipro (2025, April 16). Wipro announces results for the Quarter and Year ended March 31, 2025. Retrieved September 13, 2025, from <https://www.wipro.com/newsroom/press-releases/2025/wipro-announces-results-for-the-quarter-and-year-ended-march-31-2025/>
- [44] Zoting, S. (2025, July 15). Blockchain AI Market Poised for Strong Growth Fueled by Secure, Intelligent Technologies. Retrieved September 13, 2025, from <https://www.precedenceresearch.com/blockchain-ai-market>