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CII
Confederation of Indian Industry

Engineering Hardware Industry: Startup Ecosystem

Unlocking the Potential by identifying Areas of Improvement

Foreword

Confederation of Indian Industry (CII) is honored to present this pivotal whitepaper, “Engineering Hardware Industry Startup Ecosystem: Unlocking the Potential by Identifying Areas of Improvement". At a critical juncture for India’s engineering sector, poised for transformative growth, this publication lays out a strategic roadmap to steer the nation toward global leadership in the hardware domain. India’s ambition to emerge as a global manufacturing powerhouse by 2047 is firmly rooted in its vibrant and dynamic startup ecosystem rich in talent, innovation, and entrepreneurial ambition. The engineering hardware industry is on a robust growth trajectory, with the market projected to exceed $130 billion by 2025 and expected to sustain a strong compound annual growth rate of approximately 9.5%. Emerging technologies including artificial intelligence, nanotechnology, digital twins, and advanced manufacturing are driving a profound transformation, empowering startups to spearhead innovation across cleantech, defense, electronics, and advanced manufacturing sectors.

This whitepaper draws upon extensive primary research, capturing insights from over 120 engineering and hardware startups, complemented by rigorous secondary data analysis. It highlights significant challenges faced by these startups, such as limited access to funding tailored for hardware ventures, infrastructure bottlenecks, talent shortages in specialized fields like robotics and embedded systems, and regulatory complexities. Despite a relative slowdown in funding and intensified market competition in 2025, the report identifies critical opportunities for sustainable growth, catalyzed by government initiatives including the production-linked incentives (PLI) scheme, India AI Mission, and the emergence of innovation hubs nationwide. This whitepaper identifies key hurdles faced by engineering hardware startups, including significant access gaps in digital tools and affordable design resources. It highlights critical growth factors essential for ecosystem scaling, such as infrastructure and technology adoption, a favorable funding landscape, and the availability of a skilled talent pool. The report provides an actionable roadmap aligned with the vision of ‘Viksit Bharat’, offering comprehensive recommendations tailored for startups, investors, and policymakers. By exploring the immense potential of India’s engineering hardware startup ecosystem, this study aims to accelerate innovation and competitiveness. It underscores CII’s firm commitment to translating strategic insights into impactful action, positioning India’s hardware ecosystem as a foundational pillar in realizing the ‘Viksit Bharat’ vision.

We extend our sincere gratitude to KPMG and Synopsys for their invaluable collaboration and dedication in developing this comprehensive study. Together, we stand poised to drive transformative change and set new benchmarks for India’s engineering hardware startup ecosystem.

Mr. Kris Gopalakrishnan
Chairman
CII CIES Advisory Board & Chairman, Axilor Ventures

Confederation of Indian Industry

Foreword

Synopsys is delighted to join hands with KPMG and the Confederation of Indian Industry (CII) to present this comprehensive whitepaper on the ecosystem of engineering hardware startups in India. As a global leader in engineering solutions, Synopsys firmly believes in the transformative power of technology to redefine industries and unlock new frontiers of innovation and growth.

In a rapidly evolving market landscape marked by technological disruption and global competition, it is imperative for engineering hardware startups to continually push the frontier of innovation. This whitepaper identifies strategic areas of improvement that can unlock substantial potential within the sector - from strengthening funding mechanisms to harnessing state-of-the-art technologies for product development and operational efficiency. The recommendations can further add to the outstanding work done by the government, industry, and academia for the growth of deep tech startups in India.

At Synopsys, we recognize the importance of supporting these entrepreneurs as they pioneer new solutions and drive industry evolution. Our continued commitment to engineering solutions excellence complements the collective endeavor to build robust infrastructure and optimize resources for startups to thrive.

Moreover, this collaboration underscores our pledge to work with the ecosystem to empower startups with the tools and expertise they need to succeed, ensuring their innovations contribute meaningfully to the global engineering hardware landscape. The strategies laid out in this whitepaper represent key initiatives essential for achieving sustainable growth and seizing emerging opportunities in the market.

We commend the efforts of KPMG and CII in bringing this study to fruition, and we are proud to contribute our expertise to this significant analysis. As the industry moves forward, Synopsys stands ready to partner with stakeholders to transform possibilities into realities and enable innovators to accelerate human progress.

Murali Pullela
Sales Director and Country Manager (S&A), India
Synopsys

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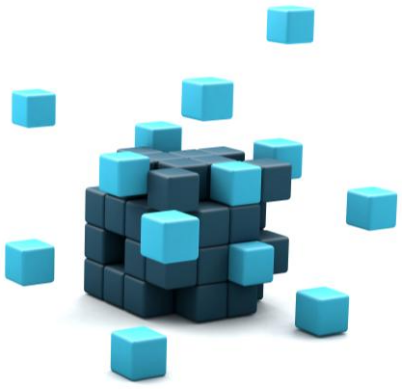


01. Executive Summary

Executive Summary

The engineering and hardware industry is undergoing a profound transformation driven by digitalization, sustainability imperatives, geopolitical shifts, and evolving customer expectations. The whitepaper, presented by KPMG India Services LLP and the Confederation of Indian Industry (CII), is a comprehensive analysis of the current landscape, critical challenges, and strategic pathways for engineering and hardware startups within the global and Indian contexts. As we stand at the threshold of significant technological advancements and economic transformations, this report underscores the strategic imperative for innovation, investment, and policy alignment to harness the burgeoning opportunities in the engineering hardware sector.

This whitepaper, developed through extensive primary research by KPMG in India and the Confederation of Indian Industry (CII), captures the pulse of over 120 engineering and hardware startups across diverse sectors including cleantech, defense, electronics, and advanced manufacturing. The findings reveal a sector brimming with potential yet grappling with structural and operational challenges that demand strategic intervention. Further supported by secondary data, the whitepaper provides a quantitative analysis of the market size, investment trends, and growth projections. It draws on industry reports, academic literature, and case studies to validate insights and present a data-driven narrative of the sector's trajectory. Comparisons with global peers illuminate best practices and strategic initiatives that Indian startups can adopt to enhance their global competitiveness.

The whitepaper concludes with actionable recommendations aimed at stakeholders across the ecosystem. For startups, strategic areas include focusing on value-added partnerships, enhancing digital capabilities, and prioritizing sustainable product development. For investors and institutions, the paper emphasizes the need for patient capital and outcome-oriented funding mechanisms. For policymakers, it advocates for continuous improvement in regulatory support, fostering collaborations between academia and industry, and strengthening IP protection.

This whitepaper serves as a comprehensive resource to inform decision-making and strategy formulation, enabling engineering and hardware startups in India and across the globe to navigate the challenging yet promising technological landscape of the future.

02. Global Outlook

2. Engineering Hardware Landscape

2.1 Engineering Hardware industry is poised for steady growth over the next few years

The engineering hardware industry is on a steady growth trajectory, with the market projected to hit $131.2 billion by the end of 2025. The market is expected to scale up to $ 296.1 billion by 2034, reflecting strong and sustained global demand, backed by a robust compounded annual growth rate of 9.46% CAGR from 2025 and 2034. While the Asia pacific region continues to hold its position as the largest growing market, the middle east and Africa are emerging as the fastest growing regions driven by infrastructure expansion, industrialization and increased investment in engineering capabilities.

This is a clear indication that the capital is moving into infrastructure, smart cities, sustainable energy systems and advanced transportation networks, signaling a global push towards future ready urban ecosystems. This transformation is further being accelerated by national and regional policy initiatives focused on sustainability, energy efficiency and digitalization.

These developments are not only enhancing operational efficiency but also driving a competitive edge for engineering companies.

There is a shift from traditional engineering practices enabled by ground-breaking technological advancements like robotics, artificial intelligence, 3D printing, Internet of Things (IoT), augmented reality which are at the forefront of this revolution, reshaping the way professionals work, innovate, and approach complex challenges.

However, increasing geopolitical uncertainty such as the US-China trade war, pressure on global trade due to rising tensions among nations, shifting trade alliances and supply chain disruptions that are having a major impact on investment flows, talent mobility, and the pace of Engineering Hardware and Design collaboration. Amidst these challenges, companies are not only navigating the complexities of Engineering Hardware and Design collaboration but are also leveraging them as opportunities to innovate, adapt and lead in a rapidly evolving landscape.

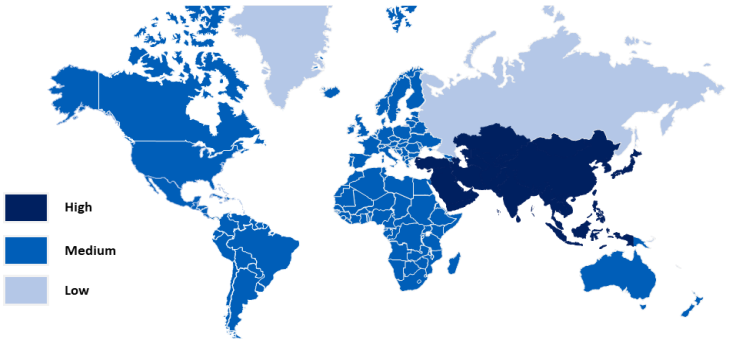


Exhibit 1. Engineering Services Outsourcing Market: Forecasted 5-year growth rate by region (2025 - 2030)

Exhibit 2. Key tenets leading to the growth of Engineering Hardware Industry

2.2 Evolving business landscape is disrupting the Engineering Hardware Industry

Exhibit 3. Global trends disrupting the Engineering Hardware industry

In an era marked by transformative shifts and unprecedented challenges, the global hardware and engineering industry stands at a pivotal crossroads. Rapid technological advancements, geopolitical uncertainties and evolving consumer expectations are reshaping the landscape, prompting businesses to rethink conventional models.

The engineering hardware industry is witnessing significant transformation through the integration of digital technologies that enhance productivity, streamline operations, and reduce costs. Key areas shaping this evolution include Sustainable circular Economy, Supply chain Resilience, Global decoupling, and Disruptive business Models.

The industry is shifting towards a circular economy focusing on sustainability, driving innovation in materials and processes to produce durable and recyclable products, creating market opportunities and disrupts traditional manufacturing. To build supply chain resilience, companies are leveraging digital tools for enhanced visibility and adaptive sourcing. Geopolitical shifts are encouraging industries to focus on local production, reducing reliance on foreign sources and ensuring adherence to domestic regulations.

Meanwhile, rapid technological progress is giving rise to innovative business models, including hardware-as-a-service and IoT integrated solutions, which leverage data driven strategies to enhance customer engagement and boost revenues. For businesses embracing these models, continuous innovation and digital transformation are essential to staying competitive in an ever-changing market landscape.

2.3 Global engineering growth is driven by a fusion of advanced technologies where AI acts as the core enabler amplifying advanced manufacturing and emerging technologies to deliver intelligent, efficient, and sustainable solutions

The engineering hardware industry is entering a transformative era, driven by an unprecedented convergence of advanced technologies. Innovations in automation, virtual engineering, advanced manufacturing, and interconnected systems are redefining how products are conceived, designed, and delivered. These developments are not merely incremental; they represent a fundamental shift in the competitive landscape enabling organizations to accelerate time-to-market while enhancing precision and efficiency.

Artificial Intelligence stands at the core of this transformation, revolutionizing hardware design and development. AI powered tools are streamlining complex processes such as code generation, verification, and layout optimization, significantly reducing development cycles and costs while improving performance.

In manufacturing, AI driven predictive maintenance and fully automated production lines are elevating reliability and throughput, while minimizing downtime. Beyond production, AI is reshaping digital and user experience design by automating repetitive tasks and enabling personalized, creative workflows. These advancements foster seamless integration between hardware and software ecosystems, driving innovation, operational agility, and sustainable technology adoption across industries.

As the sector embraces complementary technologies such as the Internet of Things, autonomous systems, nanotechnology, and advanced manufacturing, engineering hardware is poised to become the backbone of next-generation industrial solutions delivering smarter, faster, and more resilient products for a rapidly evolving global market.

Nanotechnology is transforming the engineering hardware sector by enabling development of advanced materials and manufacturing techniques that improve performance durability and efficiency. Using nanomaterials such as carbon nanotubes, graphene and nanoscale composites, engineers can create stronger, lighter and more corrosion resistant components, which is beneficial in aerospace, automotive and structural applications. Nanotechnology supports precision manufacturing, allowing for fabrication of micro and nano scale components that are crucial in fields like micro-electronics and MEMs.

Internet of Everything is revolutionizing how engineering assets and systems are managed. Unlike traditional practices that relied on scheduled inspections and scheduled maintenance, IoE enables continuous real time monitoring of equipment and infrastructure. Sensors embedded in hardware provide actionable data on performance, wear, and environmental conditions, allowing engineers to implement predictive maintenance strategies. This approach minimizes downtime, extends equipment lifespan, and optimizes resource use, directly contributing to operational efficiency and cost savings.

Virtual Engineering

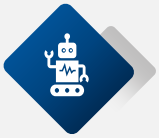
is driven by digital twins, simulation tools and augmented reality. It is transforming the design and prototyping phases of engineering. Traditionally, creating physical prototypes was time intensive and costly process. Today, digital twins and simulations offer a virtual replica of hardware systems that can be tested and optimized in a simulated environment. Engineers can analyze performance, identify potential issues, and improvements without need for physical resources. AR enhances operations by providing field technicians with real time overlays of schematics, streamlining repairs, and reducing dependencies

Hyper-automation

combines robotics, artificial intelligence, and machine learning which is eliminating bottlenecks in engineering workflows. Traditional methods often relied on manual intervention for repetitive tasks such as assembly, quality control and data analysis. Hyper automation streamlines these processes, enhancing precision while reducing costs and errors. For instance, AI powered robotic arms in manufacturing lines can identify and rectify defects in real time, ensuring consistent output. This scalability allows organizations to ramp up production without compromising quality, a critical factor in meeting the demands of a growing global market

Advanced Manufacturing

is key driver of growth with technologies like 3D printing and intelligent automation that are enabling engineers to produce complex, customized components with energy efficient practices reducing waste and reduced lead time. Traditional mass production constrained by tooling limitations, and fixed designs is giving way to agile, on demand manufacturing models contributing significantly to industries such as aerospace, automotive, and healthcare



Autonomous Systems

is transforming operations in challenging environments. From self-operating machinery to autonomous drones for infrastructure inspection, these reduce human risk and improve efficiency. These self learning systems rely on AI, ML, sensors and IoT to perceive their environment, make decisions and perform actions independently to achieve self sufficiency in operations, enhance safety and reduce dependency on human operators, especially in complex high-risk scenarios.

2.4 Building on this momentum, startups are reshaping the industry by introducing next gen innovative use cases that accelerate transformation and challenge traditional business models

Smart & Connected Factories	Miniaturization	Sustainable(solar-powered) cooling	Business Information Modelling	Solar Powered Trains / Vehicles	AI-Driven Sales Surveillance
AI Embedded Real time Defect Detection	Sustainable manufacturing	Battery Swapping Stations for commercial EV	IIOT Energy Management	IT Service Automation	Military Metaverse/ Simulation Training
Beat optimization	Advance Satellite Technologies	IoT based Smart Grid Monitoring	Indigenous Battery Pack Assembly and BMS Integration	Small Satellite Launch Vehicles	Sensor Integrated Quality Check
Autonomous electric tractors for agriculture	Automated AI based supply chain risk detection	Digital Twin and HIL setups	Regulatory and ESG Monitoring	Human Machine Interference	Integrated Green Hydrogen Production Clusters
Personalized recommendations	Chat/ voice bot for customers	Neuro-induced smart prosthetics	Additive Manufacturing & Advance Alloy	5G & 6G	Artificial Photosynthesis
Plastic Roads & Carbon Craft Installation	Connected Car / Active Safety	EV & Alternate fuel	Real-time connected Inventory for Smart Logistics	Drone Surveying & GI system	Smart Street Lighting systems
Trade promotion strategy	Intelligent Batteries		Digital Twin enabled Logistics Hardware	Plug-and-Play Modular Satellite Platforms for rapid deployment	Connected Cloud Tools
Planogram Design & Compliance	Liquid cooled-High power Highway charging corridors	Carbon Craft Construction(carbon-tiles)	3D Bioprinting for Tissue Engineering	Printed Electronics	Cybersecurity Assistant
High-Resolution Content (AR / VR / MR)	Pricing strategy & recommendation	Automated invoicing and variance analysis	Military Training & Simulation	Adaptive Smart Dashboards for Multi-mode EV driving	Vehicle Telematics systems
Rocket Engine Testing systems	Campaign optimization	Sustainable Aviation Fuel (SAF)	AI Driven Green Warehouse Networks	Supersonic & Hypersonic Technologies	Advanced Robotics
Planogram Design & Compliance	Optical Fiber Testing Tools	Fraud Detection	UAV Swarms in Combat	Industrial-grade 3D printers for prototyping	Aerospace Simulation Hardware
Distributor 360	Smart Antenna Systems for telecom base station	Communication Model (M2M, V2X, D2D & H2M)	Advance Material & Organic Electronics	Hyperspectral Satellites for Surveillance	IIOT integrated Smart Grid

As the global engineering hardware industry undergoes a seismic shift driven by digitization and sustainability, a new breed of startups is emerging not as followers, but as trailblazers reshaping the very foundations of the sector. Startups are not merely riding the wave of transformation; they are architecting the future of hardware engineering. By fusing advanced technologies with bold business models, these innovators are dismantling legacy paradigms and accelerating a shift toward intelligent, sustainable ecosystems. Imagine factories that self-optimize through AI driven defect detection, vehicles powered by modular EV platforms, and aerospace systems leveraging hyperspectral sensors and autonomous swarms. Energy pioneers are redefining resilience with green hydrogen and solar propulsion, while defense and telecom converge on immersive metaverse simulations and ultra-secure 6G networks. Retail and electronics are embracing adaptive dashboards and IoT driven personalization, creating hyper connected experiences. This is more than incremental progress, it is a systemic reinvention where agility, data, and sustainability converge. For enterprises, partnering with these disruptors is not optional, it is the gateway to relevance in a world where innovation is the new currency of competitiveness.

03. Indian Context

3.1 India, with its rapidly growing startup ecosystem, is emerging as a key hub for innovation

3.1.1 India's thriving startup ecosystem

India's startup ecosystem has emerged as a formidable force on the global stage, ranking among the top three worldwide, alongside the United States and China. As of January 2025, India boasts of having 161,150 DPIIT-recognized startups fuelled by a young, tech-savvy population and robust government initiatives. Among all Indian states, Maharashtra leads with 28,511 startups, followed by Karnataka with 16,954. These startups have generated over 1.66 million direct jobs, significantly contributing to the nation's employment landscape.

India's startup hubs are thriving, with Hyderabad, Pune and Chennai at the forefront. Mumbai became the most-funded startup hub this year with $3.67 Bn raised across 175 deals closely followed by Bengaluru, often dubbed India's Silicon Valley which hosts a vast pool of software engineering talent and home to numerous tech startups. While Hyderabad claimed the top spot on the back of the total number of deals secured since 2014 (at 384+), Pune and Chennai secured second and third places, with 382+ and 379+ deals, respectively.

With $4.7 Bn+ each, Pune and Chennai outranked Hyderabad in terms of total funding, which has been able to net $3 Bn+ since 2014. The other emerging hubs are Ahmedabad, Jaipur, Kolkata, Indore, Kochi, Chandigarh and Vadodara. Overall, the top 10 emerging startup hubs have secured a total funding of $15.5 Bn in more than 1,570 deals since 2014.

India supports its startups through a network of 1079 accelerators and incubators, managing a combined portfolio of 7,200 companies.

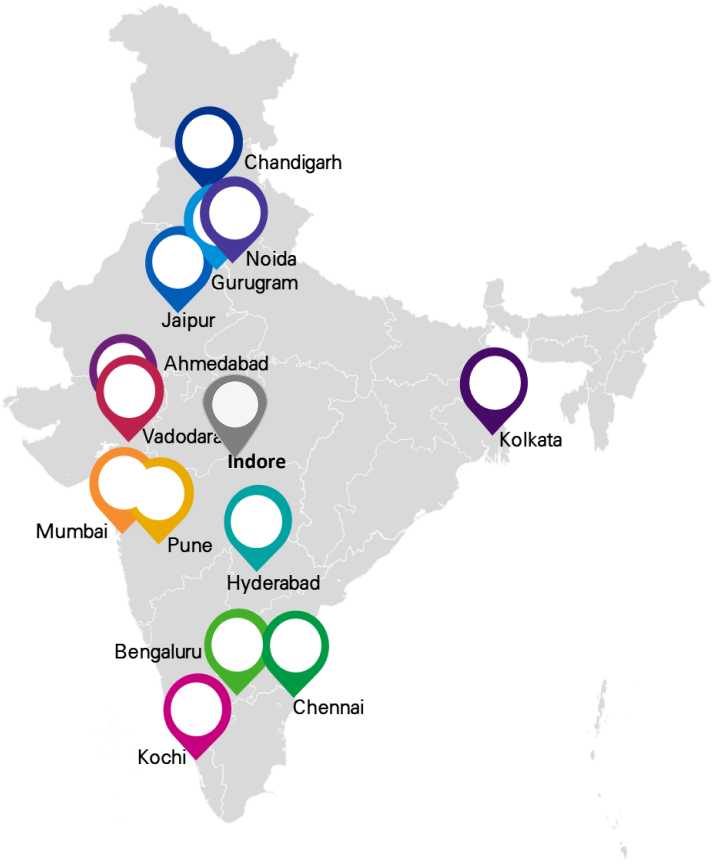


Exhibit 4. Startup ecosystem hubs of India

Programs like ASME ISHOW India are addressing the toughest challenge for hardware startups moving from prototype to market-ready product. Government backed initiatives like Startup India Seed Fund Scheme (SISFS) and ecosystem enablers such as T-Hub Hyderabad are creating a robust pipeline for commercialization.

While India's startup has largely been driven by software and digital innovation, a quiet yet powerful wave of hardware startups is now emerging, reshaping the country's ambitions in manufacturing, electronics, deep-tech and others.

3.2 Significant traction in India's engineering hardware startup ecosystem

3.2.1 India's Hardware moment

India's vision of becoming 'Viksit Bharat' by 2047 aims to position herself as a leader in global manufacturing by harnessing the power of entrepreneurship and innovation. As a result, the engineering hardware sector is set to witness rapid expansion, backed by smart infrastructure and deep tech. As India advances on this journey, it is gradually delving deeper into specific hardware sectors, marking a strategic shift from broader ambitions to focused strategic excellence.

3.2.2 Next big bet in Hardware theme

The synergy among entrepreneurial innovation, supportive govt. schemes and ever-increasing demand places India at the forefront among other emerging economies. Among the notable themes, India's SpaceTech ecosystem is making buzz globally, driven by recent favorable government initiatives like the establishment of Indian National Space Promotion and Authorization Centre (IN-SPACe) which opened the sector to private players.

With just 1 startup in 2014 to almost 266 as on date, the SpaceTech sector made significant strides as it received a whopping 1000cr VC fund for innovating cutting-edge solutions across areas such as satellite development and communications, launch vehicles, space data analytics, among others. Government's focus on indigenization within the defense sector, through initiatives like Innovations for Defense Excellence (iDEX) program', aims to engage start-ups, MSMEs, R&D institutes, and academia promoting self-reliance. Through mechanisms like SPARK Grant and support from partner incubators, startups can receive a funding of up to INR 1.5 crores facilitating prototype development, research kick start and indigenized hardware solutions. India is of course not far behind in global AI race. The indigenization of defense hardware through AI powered drones, radars, and next generation missile systems are collectively accelerating India's journey towards self reliance, while simultaneously building deep tech capabilities that anchor the country's broader engineering hardware revolution.

With a boost of ₹10,372 crore under IndiaAI Mission, India is developing its first indigenous AI GPUs, with a prototype expected to be demo ready by the end of 2025 and full-scale production planned by 2029. The government is also providing 18,000+ GPU facilities for AI development, accessible to researchers and startups. These GPUs will be designed for AI, machine learning, scientific computing, and complex simulations, not just traditional graphics rendering.

3.2 Significant traction in India's engineering hardware startup ecosystem (contd.)

The hardware ecosystem is also getting a major boost through PLI scheme of INR 23,000 crore. With proven success stories like Foxconn and Amber Enterprises leveraging earlier PLI schemes, the new initiative signals a maturing ecosystem where Indian EMS startups can evolve from assemblers to full stack component manufacturers. Other examples include tech global giant Apple's growing investment in India which includes a 435$ million semi-conductor facility with HCL to diversify its supply chain thus catalyzing India's emergence as a serious contender in advance chip packaging and high-end electronics manufacturing.

India's cleantech landscape is experiencing significant growth, with 63 startups emerging to address environmental challenges through innovative solutions. From green hydrogen to innovative solar rooftop installation solutions, from emission control to sustainable agriculture the startups are focussing on all pressing issues. Collectively, these startups have attracted substantial investments, with Ecozen alone raising over $23 million to scale its operations. India's National Electricity Plan 2023 sets an ambitious trajectory for battery energy storage systems (BESS), targeting a demand of 82.37GWh by 2026-27 and expected to increase to 2380GWh by 2047. These targets align with the government's commitment to advancing large scale energy storage infrastructure as a core enabler of the nation's clean energy transition and grid reliability initiatives. Indian startups are set to capitalize on enormous opportunities driven by combination of factors like government schemes and digital adoption.

3.3 However, the ecosystem is not without its challenges. In 2025, startups are navigating a period of relative slowdown, driven by market dynamics and intensified competition.

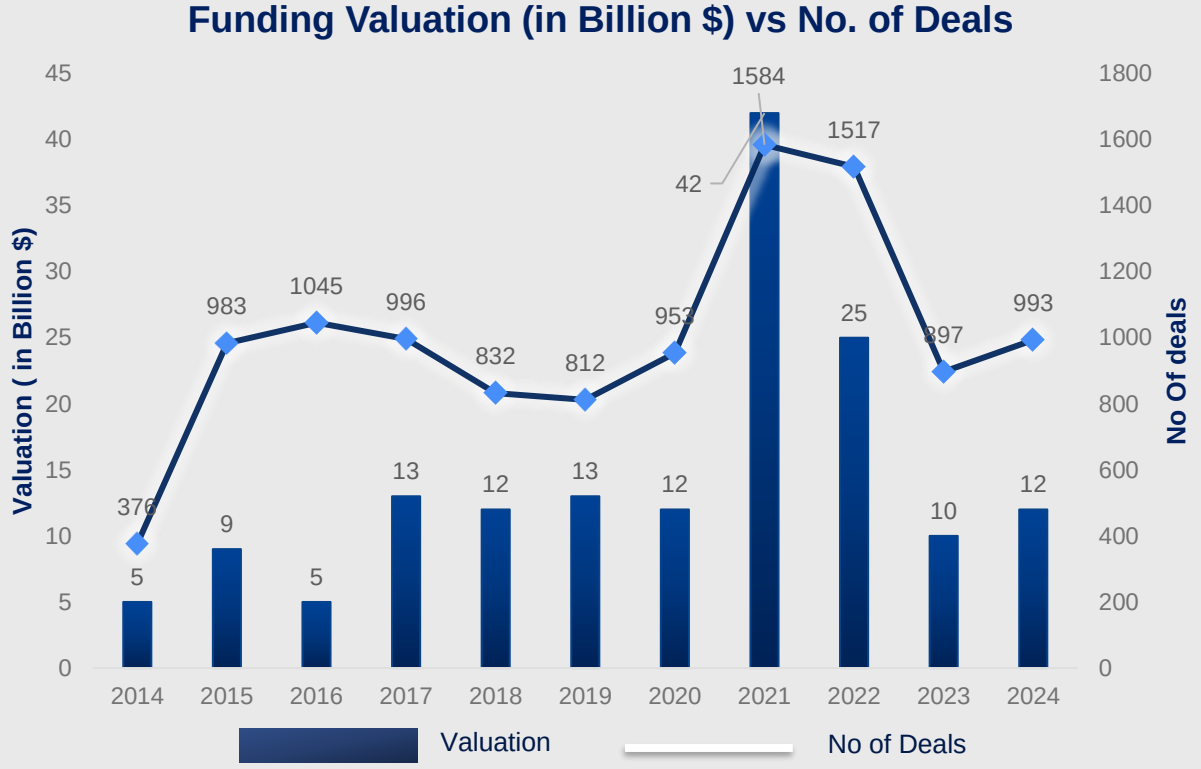


Exhibit 5. Challenges: Analyzing the Slowdown in Funding and Deal Activity

India's startup ecosystem has steadily established itself as one of the top three in the world, closely trailing the United States and China in terms of innovation, entrepreneurial activity, and venture capital interest. However, a closer look at the funding trends post pandemic reveals a sharp contrasting picture. After a steady climb through the mid 2010s, the Indian startup ecosystem witnessed an unprecedented surge in funding in 2021, peaking at $42 billion across 1,584 deals a clear indicator of investor exuberance and post-pandemic digital acceleration. Valuations soared, particularly in sectors like fintech, edtech, and SaaS, which attracted the lion's share of funding. But this momentum has not sustained. By 2023, funding plummeted to just $10 billion, less than a quarter of the 2021, peak with only 897 deals marking one of the most significant downturns in recent history. Although 2024 has shown a slight recovery with $12 billion raised across 993 deals, the overall sentiment remains cautious attributed to multiple factors: a global correction in tech valuations, tighter liquidity conditions, macroeconomic uncertainties like high interest rates, and increased scrutiny around startup governance and profitability. Indian startups are navigating this turbulence with limited safety nets.

In a nutshell, while India’s startup story continues to be a powerful narrative of resilience and ingenuity, the funding trends underscore a critical inflection point one, where long term sustainability, not just scale, will define the next wave of winners.

3.4 The challenges faced by Indian startups depict a wider strain across the country's startup ecosystem evidenced by other factors such as..

The number of unicorns show a sharp decline, 45 unicorns came up in 2021, and this number plummeted to only 2 by 2023. Many startups that were previously categorized as unicorns have seen their valuations drop due to profitability concerns and deficiencies in economic self sufficiency of the business models.

This decline was not triggered by a singular event but rather by an accumulation of interrelated challenges such as scalability frictions, strategic growth misfires and operational bottlenecks rooted in legacy systems. These issues though persistent were long obscured by the illusion of sustainability created by continuous and abundant funding.

Indian start up ecosystem saw widespread valuation cuts in the year 2022 and 2023 across multiple sectors due to factors like global economic uncertainty, funding slowdown and investor caution. Startups that saw sky high valuations during the funding boom of 2021 saw substantial markdowns as market conditions worsened. Funding in sectors like Aerospace, maritime and defense decreased by 38% in 2023 as compared to previous year.

From the data of 2023 and 2024 depicted in Exhibit 6, it's evident that many well funded popular startups have ceased their operations reflecting a challenging ecosystem. In a nutshell the startups that saw sky high valuations during 2021 eventually found themselves unable to maintain those figures and many have since either drastically downsized or shuttered altogether by 2024, as market corrections exposed fragile fundamentals and unsustainable growth models.

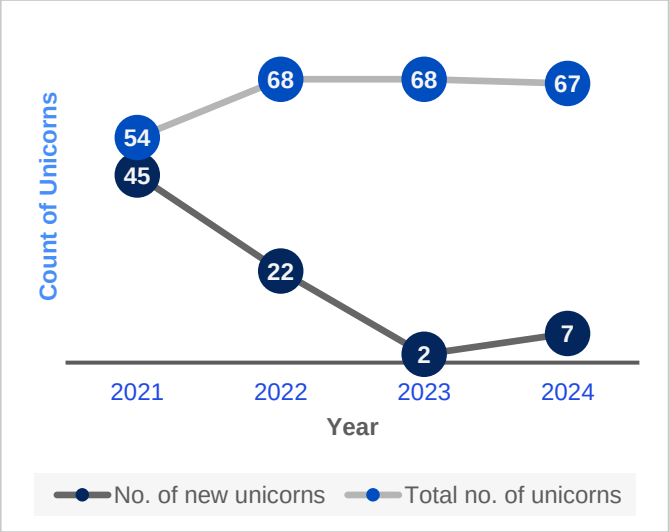


Exhibit 6. Examining the Decline in Unicorns

By Q4 of 2024 , such closures accounted for 3.3% of the startups recognized by the (DPIIT).

The surge of over 28,000 startup closures between 2021 and 2024 signals a structural correction in India's innovation ecosystem, forcing founders to pivot from aggressive growth to sustainable, capital efficient models. This wave of shutdowns underscores a strategic imperative, resilience and profitability have replaced hyper scaling as the new benchmarks for survival in India's post boom startup landscape.

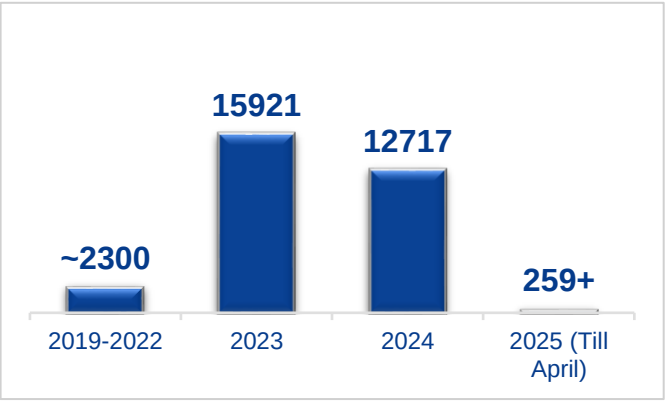


Exhibit 7. Number of Startups closed in recent years

04.
Way Ahead

4.1 Critical Challenges Hindering growth of India's Engineering & Hardware Startup Ecosystem

The Indian Engineering and Hardware startup ecosystem stands at a critical juncture in 2025, confronting a complex landscape of technological disruptions, economic volatility, and global competitive pressures. However, despite a robust entrepreneurial ecosystem, these startups face unique and multifaceted challenges which is evident from the primary research jointly conducted by CII and KPMG India.

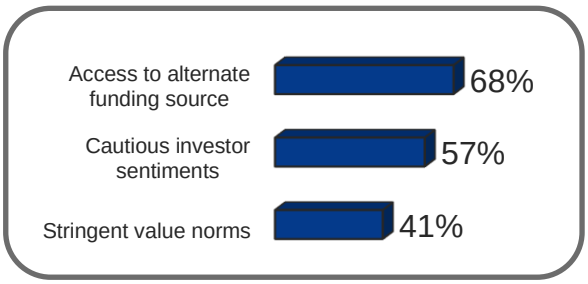


Exhibit 7.1. Funding Pitfalls

The post-pandemic investment climate is conservative, with venture capitalist's sentiment being cautious and diligent. Hardware startups encounter funding challenges owing to lengthy product development cycles and limited insight from traditional platforms into hardware innovation potential, affecting investment dynamics and necessitating startups to tackle investor reluctance and comprehension gaps.

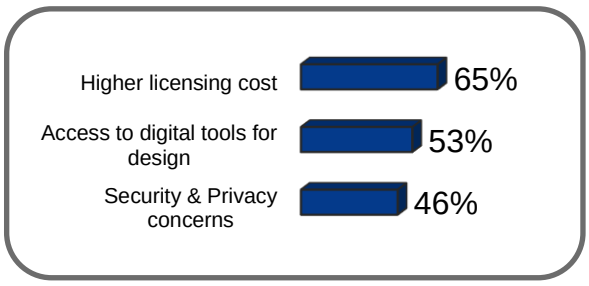


Exhibit 7.2. Digital Infrastructure Pitfalls

Engineering hardware startups in India navigate software updates, while cybersecurity threats endanger digital assets. Regulatory ambiguities complicate compliance. Additionally, high licensing & infrastructure costs pose financial burdens, all impeding growth and operational efficiency.

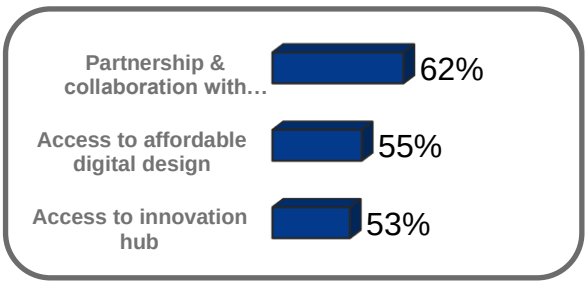


Exhibit 7.3. Development & Innovation Pitfalls

Indian engineering and hardware startups encounter substantial barriers in technology adoption and innovation, grappling with high initial costs, complex system integration, and swift technological shifts. Access to leading-edge technologies, advanced research facilities, alliances with strategic partners and government-backed support is inadequate, further complicating efforts to innovate and remain competitive.

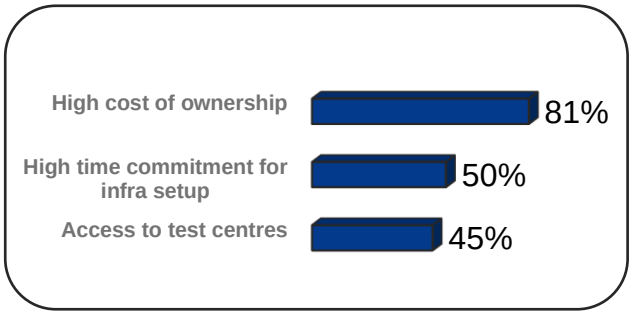


Exhibit 7.4. Physical Infrastructure Pitfalls

Hardware startups face steep upfront capital demands, with significant funding needed for prototyping, manufacturing setup, and initial production runs often beyond the scope of traditional startup models. Limited access to testing facilities, affordable labs, and advanced equipment further drives up costs, creating additional barriers to early-stage innovation.

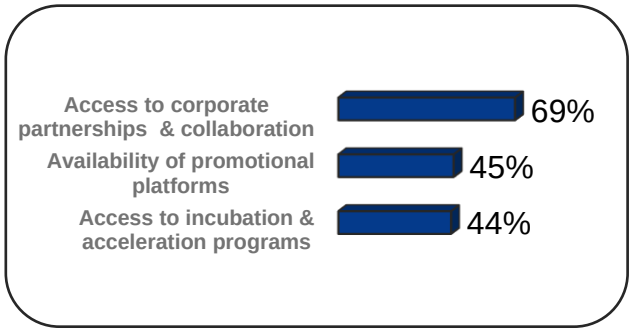


Exhibit 7.5. Ecosystem Pitfalls

Indian engineering and hardware startups encounter complex market dynamics and competitive pressures amid rapid technological advances. Sustained R&D investment is essential to maintain relevance. Launching innovative products requires overcoming consumer hesitation, demanding strategic marketing and educational efforts to foster trust and stimulate adoption in this evolving landscape.

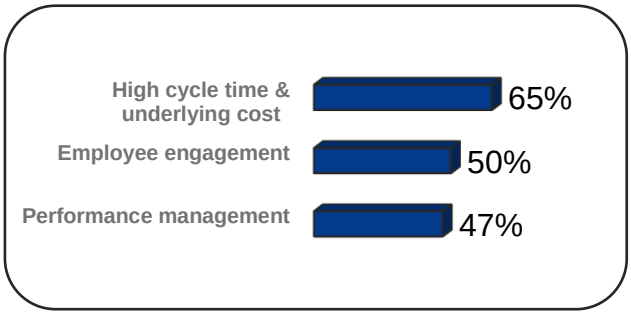


Exhibit 7.6. Skilled Talent Pitfalls

Engineering and hardware startups face talent shortages in fields like robotics and embedded systems, leading to increased cycle times, higher costs, and engagement issues. This gap hinders performance management. Addressing this involves enhancing training, engagement strategies, and refining metrics to boost innovation and competitiveness in the industry.

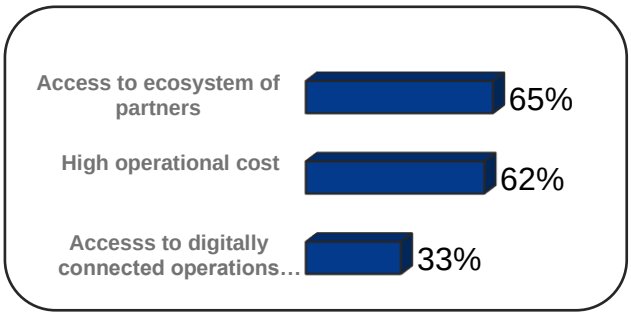


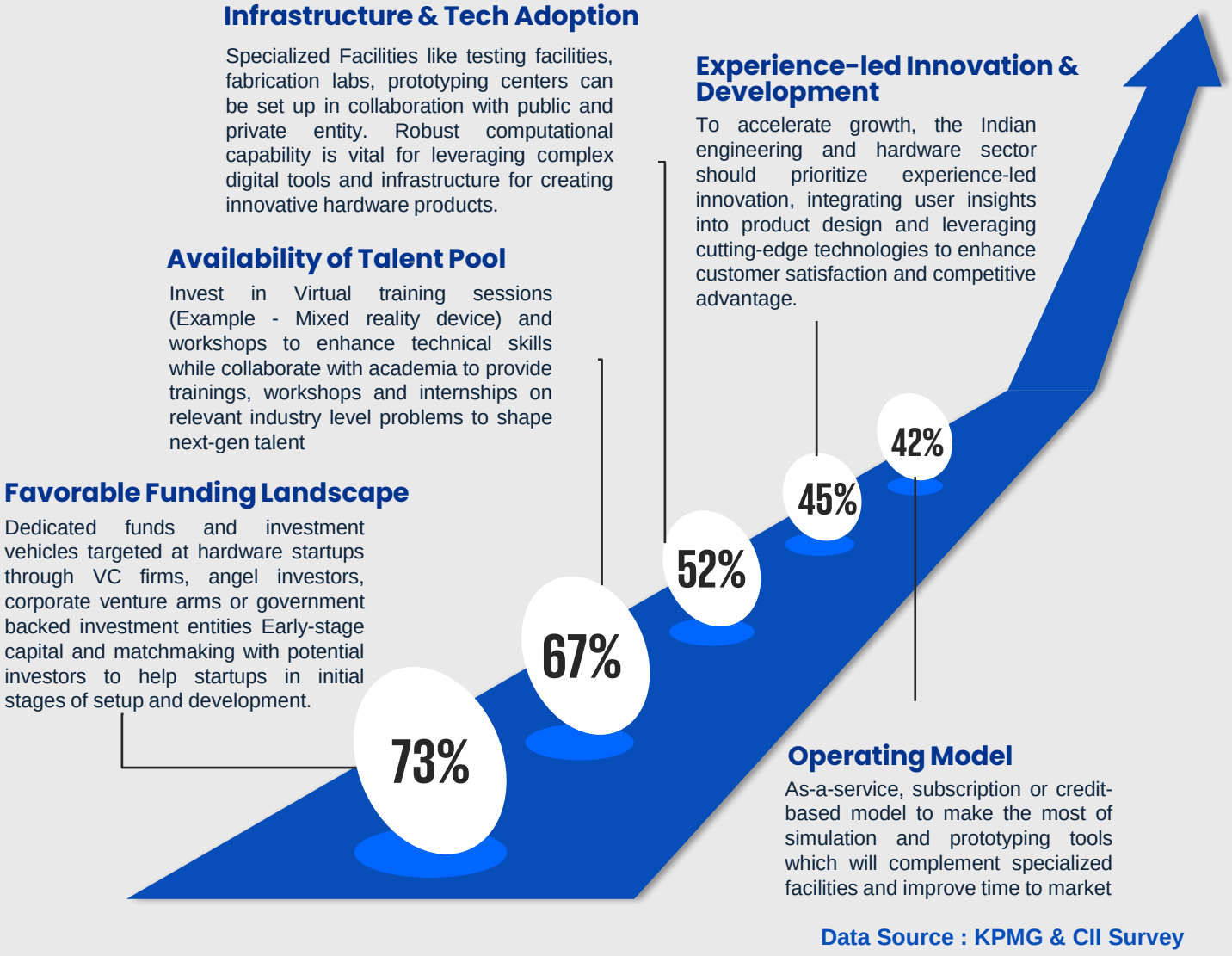
Exhibit 7.7. Operations Pitfalls

Engineering and hardware startups face operational challenges in 2024, including limited ecosystem partnerships, high costs, and insufficient digital platforms. Strengthening partnerships, optimizing manufacturing, and adopting digital tools are vital to mitigate supply chain vulnerabilities, reduce costs, enhance efficiency, and drive innovation, ensuring resilience amid geopolitical and economic uncertainties.

4.2 But amidst these challenges, lies an opportunity for growth and innovation. The way ahead, some key areas which can help compel organizations to redefine and reimagine future road map

The Engineering and hardware startup ecosystem is experiencing a transformative phrase, driven by technological innovations, market demands, and emerging global challenges. These startups span industries such as electronics, robotics, Internet of Things (IoT), renewable energy and advanced manufacturing automation. The KPMG and CII's primary research provides a comprehensive analysis of the critical factors driving the growth and strategic imperatives for the startups in this dynamic sector.

Exhibit 8. Critical Growth Factors: Key Growth Factors in the Hardware Industry from KPMG and CII Research



Data Source : KPMG & CII Survey

4.3 The success of hardware startups hinges on the several interconnected critical growth factors that must be carefully managed

1 Democratization of Digital Tools & Infrastructure

Advanced digital tools for simulation and design are indispensable drivers of innovation, and ensuring broad access is a strategic imperative. Incubators and academic institutions can play a transformative role by offering these tools to startups at nominal costs, creating an inclusive environment for technological advancement. Governments can play a pivotal role in reinforcing this momentum by providing cost incentives for annual investments in digital infrastructure, recognizing these capabilities as foundational to innovation, equivalent in importance to physical infrastructure such as laboratories and collaborative spaces.

2 Shared Physical Infrastructure for Testing

Establishing shared experimental and testing facilities in metro and Tier-1 cities is essential to enhance cost efficiency and ensure accessibility for emerging ventures. Universities and research institutions should prioritize the development of these facilities and make them available to qualified startups, creating a collaborative ecosystem for innovation. Access should be contingent upon validated concepts through digital simulation, ensuring optimal utilization of resources and maintaining high standards of feasibility and impact.

3 Early-Stage Funding Based on Digital Validation

To accelerate innovation, investors should be encouraged to provide seed or early-stage funding based on robust digital validation, such as simulation and modeling, prior to the development of physical prototypes. This approach reduces risk, shortens time-to-market, and fosters confidence in concept viability. Governments can play a pivotal role by offering tax incentives to investors and creating ideation funds for incubators, thereby strengthening the ecosystem for early-stage ventures. Additionally, universities and research institutions should establish dedicated idea assessment committees to evaluate digitally validated concepts and facilitate funding for promising innovations

4 Visibility & Market Access for Startups

Enhancing visibility and market access is critical for the growth of early-stage ventures. Governments and technology providers can actively support startups by funding their participation in trade shows, particularly those with working prototypes and initial customers. Organizing deep-tech trade fairs, facilitating media coverage, and inviting startups to present at industry events can further strengthen their market presence. Additionally, showcasing success stories through press releases and technology exhibitions will build credibility and attract potential investors and partners

5 Establishing Centers of Excellence

Establishing Centers of Excellence (CoEs) and industry consortia that bring together universities, incubators, and corporate stakeholders is critical for advancing key technologies and sectors. These hubs should function as integrated platforms for idea validation, expert feedback, and strategic guidance, enabling innovators to access specialized resources and domain expertise. Successful examples include automotive CoEs at ARAI and IIT Madras in Chennai and Pune, which demonstrate the value of collaborative ecosystems in accelerating innovation and commercialization

6 Academia-Startup Skill Partnerships

Designating key Tier-1 and Tier-2 universities as Centers of Excellence for skill development in emerging technologies is essential to building a future-ready workforce. Governments and technology providers can collaborate to create industry-aligned curricula and training programs that address evolving market needs. Startups can leverage these partnerships by outsourcing projects and engaging students, thereby creating a robust talent pipeline that combines academic rigor with practical experience

Hardware engineering industry is unforgiving through capital-intensive cycles, certification bottlenecks, and scale-up risks can sink promising ideas. The antidote is an orchestrated, mission-driven ecosystem where incentives, governance, and technical rigor are aligned end-to-end. Success begins with seamless collaboration across academia, government, corporates, private capital, incubators, and accelerators each role explicitly mapped to the product journey (from concept to TRL milestones, pilot manufacturing, and market adoption) and rewarded through well-aligned incentives that prioritize shared outcomes over isolated wins.

A mission led research framework anchors this collaboration. University laboratories operate as registered micro-units with clearly defined specializations, capabilities, and transparent profiles (past grants, student participation, research outputs, IP and licensing status). This visibility builds trust and accountability across the value chain and enables precise matchmaking between national needs and lab strengths. Government and industry publish national problem statements with clear outcome expectations and TRL targets; labs and startups respond via standardized pre-proposals, triaged within a fixed window to eliminate drift, followed by multi-year, milestone-based awards for selected programs.

To protect capital and accelerate learning, a simulation-first doctrine is mandated before accessing high risk or high-cost physical testing. By exhausting digital twins, FEA, CFD, HIL/SIL setups, and model-based safety cases, teams reduce trial-and-error, compress timelines, and improve first-time-right rates. Labs and startups that hit milestones are auto-qualified for advanced grants, with pre-defined pathways to licensing, tech transfer, and commercialization including certification roadmaps, pilot-line access, supply-chain onboarding, and early customer validation in controlled environments.

Critically, this architecture ties funding to evidence and readiness not slideware while ensuring the ecosystem rewards repeatable engineering excellence and capital efficiency. It enables VCs and corporates to underwrite scale with confidence; it empowers universities to convert research into products, and it gives government a mechanism to translate national priorities into deployable hardware, quickly and safely. When these growth factors are managed as a single operating system aligned incentives, mission clarity, transparent capability, simulation discipline, and milestone gated capital hardware startups shift from fragile experimentation to durable, compounding value creation.

Conclusion

India's engineering hardware industry stands at an inflection point, poised for global leadership. The sector's success will hinge on how decisively leaders harness seven foundational enablers funding, digital infrastructure, innovation, physical assets, ecosystem depth, skilled talent, and operational resilience.

These elements form a dynamic network of opportunities, where progress in one area amplifies gains across the system. Incremental steps can create momentum, but what will truly unlock potential is a unified transformation agenda that integrates capital, technology, talent, and governance under a shared vision.

We propose a shift from isolated initiatives to a programmatic approach anchored on five imperatives: first, democratize access to advanced digital tools and secure design platforms, establishing a digital backbone that accelerates product development and safeguards intellectual property. Second, reimagine funding through blended and patient capital models linked to procurement-led demand, giving startups predictable cash flow and confidence to scale. Third, institutionalize mission-driven innovation with simulation-first validation and standardized stage gates, reducing time-to-market and optimizing high-value physical testing. Fourth, build shared testbeds and on-demand manufacturing clusters to lower capital intensity and enable rapid prototyping and certification. Finally, invest in a future-ready workforce through micro-credentialed programs and embed lean, digitally enabled operations with robust compliance frameworks to ensure resilience and scalability.

This is more than an industry roadmap; it is a national competitiveness opportunity. CXOs can lead by fostering collaborative ecosystems, co-investing in infrastructure, and championing policy advocacy for streamlined regulations and tax incentives. The outcome is clear: a globally competitive hardware sector that drives innovation, creates high-value jobs, and positions India as a leader in space technology, defense, clean-tech, advanced manufacturing, and beyond. The moment to act is here. A two-year, portfolio-level transformation powered by shared infrastructure, digital democratization, and coordinated governance will turn today's possibilities into platforms for growth.

The question is not whether India will lead or not, but how quickly we choose to seize the opportunity is what will decide the future of the sector.

05. Methodology & Acknowledgement

Methodology

The premise of this report is based on sources of information, meetings and brainstorming sessions undertaken by KPMG in India and CII industry leaders.

Interviews and Survey:

The insights published in this report are primarily based on the interviews and 'CII KPMG survey on 'Engineering Hardware Industry Unlocking the potential by identifying areas of improvement'. The participants in the interview and survey were various start-ups leaders involved in heading and managing the startup operations in India such as Managing Directors, CEO's, Vice Presidents, Country Heads, Chief Operating Officers, Divisional Heads, Chief Technology Officers,, Head of Operations, Head of Talent etc.

The interview and survey has representation from startups belonging to various sectors, size, scale and operations. Here's an overview:

Sector coverage:

- Defense
- Cleantech
- Electronics
- Nano Technologies
- Engineering Services
- And other related areas

Tenure of operations: Responses covers start-ups as young as less than 3 years old to over 20+ years of operations in India

Range of operations: Start-ups who participated in interviews & surveys had a diverse range of operations such as:

- Centre of Excellence
- Cyber Security, Data analytics
- R&D, Innovation, Deep tech
- Digital technology support
- Business Operations Support
- Manufacturers

Meetings with industry leaders: The industry and service line leaders at KPMG in India were interviewed, consulted and brainstorming sessions were conducted for frameworks and mitigation measures, industry best practices to address the risk themes in the report.

Primary Research: The industry experts at KPMG in India and CII conducted detailed primary research of 129 start-up leaders. The team did further analysis to gain insights from the responses.

Secondary Research: The industry experts at KPMG in India conducted detailed secondary research. The team relied on proprietary databases, and public websites to gain better understanding into each insight.

Content review: Multiple reviews were conducted by the leaders from KPMG in India and CII

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06. Disclaimer

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About CII

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9,700 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 365,000 enterprises from 318 national and regional sectoral industry bodies.

For more 130 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. CII charts change by working closely with the Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness, and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Through its dedicated Centers of Excellence and Industry competitiveness initiatives, promotion of innovation and technology adoption, and partnerships for sustainability, CII plays a transformative part in shaping the future of the nation. Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes across diverse domains, including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

For 2025-26, CII has identified "Accelerating Competitiveness: Globalization, Inclusivity, Sustainability, Trust" as its theme, prioritizing five key pillars. During the year, CII will align its initiatives to drive strategic action aimed at enhancing India's competitiveness by promoting global engagement, inclusive growth, sustainable practices, and a foundation of trust.

With 70 offices, including 12 Centers of Excellence, in India, and 9 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with about 250 counterpart organizations in almost 100 countries, CII serves as a reference point for Indian industry and the international business community.

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