

# INVESTORS ROUNDTABLE INDUSTRY 4.0

---

## INTEL REPORT

A comprehensive Overview of Challenges, Insights,  
and Opportunities from Industry 4.0 Investors

2024

INDUSTRY 4.0 INVESTMENT LANDSCAPE

# TABLE OF CONTENT

Executive Summary	03
Preface	05
Support Statement	06
What is Industry 4.0?	07
The Global Ecosystem	08
Recent Investment Trends	08
Seizing the moment for Industry 4.0	09
Notable Startups in the Industry 4.0 Space	11
Global Lessons in Industry 4.0	12
The Roundtable Highlights	15
Focus Areas of Discussion	16
The Big Questions	21
Winning Formula	23
The Road ahead	25
Reference Links	27
Credits	29



# EXECUTIVE SUMMARY

Industry 4.0 is revolutionizing global industries with cutting-edge technologies like AI, IoT, robotics, and big data, driving unprecedented growth and efficiency. In India, this transformation holds immense promise, with the Industry 4.0 market projected to grow exponentially, supported by government initiatives and increasing digital adoption.

As India looks to expand its manufacturing sector, we find ourselves at a pivotal moment—a moment to leap forward and set new standards in operational efficiency and technological innovation. Much like how UPI transformed the way we make payments, skipping credit cards and moving directly to a digital-first economy, Industry 4.0 presents us with a similar opportunity. We can bypass legacy systems and embrace the most advanced tools and practices to redefine what's possible.

The potential here is immense, and there's a growing sense of hope and anticipation about what India can achieve. But what's missing is a unified, India-specific roadmap that ties together all the key players. This report is the first step toward bridging that gap. It captures perspectives from across the ecosystem—innovators developing solutions, investors

providing capital, policymakers creating frameworks, academia building research, and industries preparing for AI-driven transformation.

As Dr. APJ Abdul Kalam said, "You have to dream before your dreams can come true." This is India's moment to dream big and act decisively. By combining collaboration with innovation, and ambition with action, we can position India as a global leader in Industry 4.0. Let's use this opportunity to work together and create a manufacturing ecosystem that is future-ready, globally competitive, and uniquely Indian.



**Dr. Anshul Vikram Pandey, PhD**

Founder and Chairman  
PanScience Innovations



The adoption of digital technology in industrial operations, also known as Industry4.0 is at the verge of exponential take-off in India. While this adoption has been there for over decades, the recent advances in compute power, storage, and communication along with declining cost of hardware have opened the possibility of large-scale adoption, including by SME players.

In India the startup community plays key role in development of solutions for adoption by various end-user industries. Despite the apparent benefits to industries, the startups face steep survival challenges when it comes to raising funds for their operations due to

mismatch between what they believe in and what investor community expects.

The report is an attempt to address the gap between different players in the ecosystem and make it easier for startups to work with investors. Ultimately the aim is to enable the innovators to build strong solution base which can address the digital technology adoption challenges of manufacturing industries and subsequently go global with their solutions.

### Sudhanshu Mittal

Head & Director Technical Solutions

Nasscom

Lead- Digital Healthcare & Industry 4.0



#### This deck highlights:

- The investment potential in India's Industry 4.0 ecosystem, backed by insights into market size, growth rates, and funding trends.
- Key challenges faced by startups in scaling solutions, including market readiness, funding gaps, and infrastructure limitations.
- Opportunities for startups to innovate for both domestic and global markets, leveraging India's unique positioning as a manufacturing and tech hub.
- Actionable recommendations for investors, startups, and policymakers to drive collaboration, innovation, and growth.

Supported by insights from experts and market leaders, this report is designed to serve as a valuable resource for venture capitalists, entrepreneurs, and stakeholders looking to navigate and capitalize on India's Industry 4.0 revolution.





# PREFACE

The dawn of the Fourth Industrial Revolution, commonly referred to as Industry 4.0, marks a significant turning point in the way industries operate and innovate. This revolution is characterised by the fusion of digital technologies—including artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and advanced robotics—into traditional manufacturing and service sectors. As these technologies converge, they create unprecedented opportunities for enhancing efficiency, productivity, and competitiveness on a global scale.

In this transformative landscape, India stands out as a vibrant hub of potential. With its dynamic startup ecosystem and a youthful, tech-savvy workforce, the country is poised to leverage the benefits of Industry 4.0. However, this journey is not without its complexities. Indian startups face a unique set of challenges, including regulatory hurdles, inconsistent technological adoption across sectors, and a pressing need for skill development. These factors can hinder growth and limit the ability to capitalize on the vast opportunities presented by this new industrial era.

A compelling example of innovation within this context is India's Unified Payments Interface (UPI), which has revolutionised the digital payments landscape. By enabling seamless transactions and integrating multiple banking services into a single platform, UPI has transformed how millions of Indians engage with financial services. This success story illustrates the transformative potential of well-implemented digital solutions in driving economic growth and fostering inclusivity. Recognizing the critical juncture at which India finds itself in the realm of Industry 4.0, this report aims to provide a comprehensive analysis of the current state of affairs. It seeks to illuminate both the opportunities that lie ahead and the challenges that must be addressed to ensure sustainable growth. By consolidating insights from industry leaders, venture capitalists, and entrepreneurs through a series of roundtable discussions, we aim to create an invaluable resource for stakeholders across the ecosystem.

By synthesising perspectives from industry pioneers, investors, and entrepreneurs, this report aims to serve as both a compass and a catalyst. Whether you are a venture capitalist evaluating the next frontier of innovation, a start-up navigating the intricacies of this industrial shift, or a policy-maker seeking to align with the future, this report offers clarity, strategy, and actionable insights. Industry 4.0 is not merely an opportunity; it is a mandate for India to redefine its industrial trajectory and shape a future that reflects its vast potential. This is the moment to act, to innovate boldly, and to build collaboratively. We hope this report inspires the dialogue, decisions, and disruptions needed to place India at the forefront of the Fourth Industrial Revolution.

# SUPPORT STATEMENT



"I4.0 advancement is reshaping manufacturing landscape, and creating incredible scenarios for achieving higher degree of business performance. The roundtable dialogue offered food for thought on the challenges and opportunities as we move along on this transformational journey".

---

**Vivek Datta** CEO - ThirdEye AI (A JBM Group Company)  
EVP, JBM Group (Digital, AI & Industry 4.0)



"I see Industry 4.0 as a game-changer, blending technologies like IoT, AI, and automation to redefine what's possible for businesses. This revolution presents unparalleled opportunities to drive efficiency, build smarter systems, and create meaningful value. Collaboration is at the heart of this transformation, and we're passionate about partnering with forward-thinking organisations to navigate these changes and shape a more innovative, sustainable future".

---

**Vikram U** Founder & Promoter – Mobility & Automobile Innovation Lab (M.A.I.L.)



"Industry 4.0 is reshaping the ecosystem, bridging gaps, and creating unparalleled opportunities for Indian innovation to be taken across the world. The Indian Ecosystem needs to collectively market itself to compete globally, valuable insights were discussed at the event. It was a privilege to engage with industry leaders and discuss how we can collectively drive this transformation".

---

**Ish Anand** Board Member – iCapital Ventures  
Global Vice President – EIC Corporation



"Building in India means mastering a delicate balance. On one hand, you've got to stay grounded in local realities—this is where you scale-test, refine, and prove your model. But on the other hand, you can't afford to think small, because it's not just about building a product—it's about securing investor alpha & aligning with a vision that has global reach. If you're not aiming with global ambition, you're missing the point. India is the proving ground, but the vision has to be big enough to go beyond it".

---

**KD Pathak** Investment Banking – Boon Capital

# WHAT IS INDUSTRY 4.0?

As we stand at the threshold of a new industrial era, Industry 4.0 emerges as a pivotal force reshaping the landscape of manufacturing and industrial processes across the globe. Characterized by the integration of advanced digital technologies, such as artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and robotics, Industry 4.0 signifies a transformative shift that goes beyond mere technological upgrades. It represents a fundamental change in how industries operate, innovate, and engage with their stakeholders. The term "Industry 4.0" was first introduced at the Hannover Fair in Germany in 2011 as part of a strategic.

initiative aimed at enhancing the competitiveness of German manufacturing through digitalization. Since then, it has evolved into a globally recognized concept that encompasses various sectors beyond manufacturing, including logistics (Logistics 4.0), construction (Construction 4.0), and energy (Energy 4.0). The journey to this point has been marked by three previous industrial revolutions: the mechanization of production processes in the late 18th century, the introduction of mass production and electricity in the early 20th century, and the automation brought about by electronics and information technology in the late 20th century.

## Cyber-Physical Systems (CPS)

These systems integrate physical processes with computational capabilities, enabling real-time monitoring and control of manufacturing operations.

## AI ML

AI algorithms analyze vast amounts of data to optimize processes, improve product quality, and enhance productivity.

## Cybersecurity

As industries become more interconnected, robust cybersecurity measures are essential to protect sensitive data and critical infrastructure from cyber threats.

## Internet of Things (IoT)

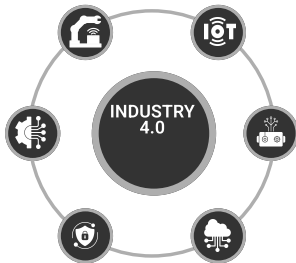
IoT devices collect and transmit data from machines and sensors, facilitating intelligent decision-making and predictive maintenance.

## Robotics

Advanced robotics and collaborative robots (cobots) work alongside human operators to perform tasks with greater precision, efficiency, and safety.

## Cloud computing

Cloud-based solutions provide scalable computing resources that enable organizations to harness data-driven insights for innovation.

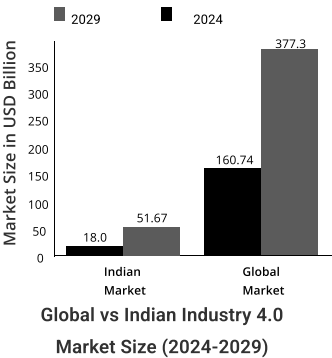


# THE GLOBAL ECOSYSTEM

The global ecosystem surrounding Industry 4.0 is characterized by rapid technological advancements and increasing investments in digital transformation initiatives. Countries such as Germany, the United States, and China are at the forefront of this revolution, each adopting unique strategies to leverage Industry 4.0 technologies for economic growth.

Germany's "Industrie 4.0" initiative serves as a model for other nations, emphasizing government support for research and development while fostering collaboration among industry stakeholders.

The United States benefits from a robust innovation ecosystem that encourages startups through access to venture capital and technology hubs like Silicon Valley. Meanwhile, China's "Made in China 2025" initiative aims to position itself as a global manufacturing powerhouse by integrating advanced technologies into production processes.

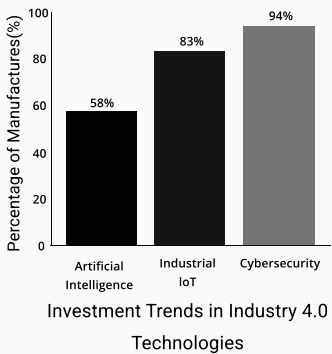


# RECENT INVESTMENT TRENDS

The VC landscape for Industry 4.0 technologies has grown significantly, highlighting the value of digital transformation across sectors. Global VC funding for Industry 4.0 startups recently surged to around \$6.6 billion, reflecting increasing interest in technologies that boost efficiency and drive innovation.

Recent data indicates that manufacturers are prioritizing investments in key areas of Industry 4.0:

- **Cybersecurity:** 94% of manufacturers have invested in cybersecurity measures, reflecting a heightened awareness of the importance of protecting connected systems and data.
- **Industrial Internet of Things (IoT):** Investment in IoT technologies has increased significantly, with 83% of manufacturers focusing their budgets on this area.
- **Artificial Intelligence (AI):** Approximately 58% of manufacturers are investing in AI technologies to optimize processes and improve decision-making capabilities.



# SEIZING THE MOMENT FOR INDUSTRY 4.0<sup>[1]</sup>

The current landscape presents a unique convergence of factors that make this the ideal time for businesses to embrace Industry 4.0

## 1. Technological Maturity

The rapid advancement of technologies such as AI, IoT, and big data analytics has reached a level of maturity that enables their effective implementation in manufacturing processes. Companies can now leverage these technologies more easily than ever before.

For instance, Siemens, a global leader in automation and digitalization, has integrated IoT technologies into its operations, resulting in enhanced efficiency.

and productivity. The company's use of digital twins—virtual replicas of physical systems—has allowed for real-time monitoring and predictive maintenance, significantly reducing downtime and operational costs. In their Amberg facility in Germany, Siemens reported that the implementation of Industry 4.0 technologies led to a 30% increase in productivity and a 50% reduction in time-to-market for new products.

## 2. Competitive

As global markets become increasingly competitive, companies must adopt innovative practices to differentiate themselves. Industry 4.0 offers tools for enhanced efficiency, quality control, and customer engagement—essential elements for maintaining a competitive edge. In the United States, General Electric (GE) has embraced Industry 4.0 by leveraging big

data analytics and AI to optimize its manufacturing processes. GE's Predix platform enables industrial companies to analyze data from machines and devices, leading to improved operational efficiency and reduced costs. The implementation of these technologies has allowed GE to save over \$1 billion in operational costs annually through enhanced efficiency.

## 3. Cost Reduction

The integration of smart technologies can lead to significant cost savings through optimized resource management and reduced operational inefficiencies. For example, Bosch, a multinational engineering and technology company, has implemented predictive maintenance across its

manufacturing plants. This approach has decreased equipment downtime by up to 30%, translating into substantial financial benefits. Bosch estimates that these initiatives will save them approximately €1 billion annually by 2025 due to reduced maintenance costs and increased productivity.

## 4. Government Support

Many governments worldwide are recognizing the importance of digital transformation in driving economic growth and are implementing policies to support this transition. In India, initiatives aimed at fostering innovation and technology adoption provide a conducive environment for startups and established firms alike. In Germany, the government has invested heavily in the "Industrie 4.0" initiative, which aims to foster collaboration between

industry and academia while providing funding for research projects. Since its inception, over €200 million has been allocated to support innovation in manufacturing technologies . Similarly, the Indian government is promoting initiatives such as Digital India and Make in India, which aim to create a conducive environment for startups focused on technology adoption.

## 5. Changing Consumer Expectations

Modern consumers expect personalized, responsive, and innovative experiences from manufacturers. Industry 4.0 technologies empower businesses to harness real-time data to anticipate and meet these demands. A striking example is Tesla, which uses IoT and over-the-air (OTA) updates to continuously enhance its vehicles based on customer feedback and usage patterns.

Tesla's ability to gather real-time data from its cars allows it to customise features, optimise performance, and even roll out entirely new functionalities, ensuring a product experience that evolves with the consumer. This level of personalisation not only elevates customer satisfaction but also fosters brand loyalty by aligning products with dynamic consumer expectations.

## 6. Sustainability Goals

As sustainability becomes a critical focus for businesses globally, Industry 4.0 offers solutions that promote resource efficiency and waste reduction. Smart manufacturing practices can help companies meet their sustainability targets while improving their bottom line. Unilever, for instance, has adopted smart manufacturing practices that leverage IoT sensors to monitor energy

usage across its production facilities. This initiative has enabled Unilever to reduce its carbon footprint significantly while achieving operational efficiencies that contribute positively to its bottom line . By integrating sustainable practices into their operations through Industry 4.0 technologies, companies can meet their sustainability targets while enhancing profitability.

Industry 4.0 marks a fundamental shift in industrial operations, not just a trend. The time to prioritize this evolution is NOW, as adopting these technologies is vital for staying competitive in a digital economy. By integrating them into manufacturing, businesses can innovate and reshape customer experiences for the future.



NOTABLE STARTUPS IN THE INDUSTRY 4.0 SPACE

[2]

The following table highlights notable startups operating within the Industry 4.0 ecosystem, showcasing their contributions and potential for growth. This list aims to excite investors about the opportunities available in this rapidly evolving landscape.

	Name	Geography	Founding Year	Current Stage	Estimated Valuation
Predictive Maintenance	Senseye	USA	2016	Series B	\$40 million
	MachineMetrics	USA	2014	Series B	\$30 million
	Altizon	India	2013	Series A	\$20 million
Digital Twin Technology	Akselos	Switzerland	2015	Public	\$1 billion
	Siemens Digital Industries	Germany	1847	Established	\$10 billion
	Wipro	India	1945	Established	\$9 billion
IoT Solutions	Foghorn	USA	2014	Series C	\$75 million
	Litmus	USA	2013	Series B	\$50 million
	Locus.sh	USA	2010	Series D	\$100 million
AI/ML	Seebo	Israel	2012	Series C	\$60 million
	Quartica.ai	USA	2018	Series B	\$40 million
	Gramener	India	2011	Growth	\$100 million
Robotics & Automation	BrightMachines	USA	2018	Series D	\$500 million
	Rightand Robotics	USA	2014	Series B	\$100 million
	GreyOranges	India	2011	Series C	\$1 billion
Supply Chain Management	Verusen	USA	2014	Series B	\$75 million
	Highbyte	USA	2013	Series A	\$50 million
	Zebra Technologies	USA/India	1969	Established	\$10 million
Augmented Reality Solutions	Augmentir	USA	2018	Series A	\$15 million
	Slightsync	USA	2020	Seed	\$5 million

# GLOBAL LESSONS IN INDUSTRY 4.0

## GERMANY

### Strong Government Support<sup>[3]</sup>

The German government has implemented the "Industrie 4.0" initiative, investing over €200 million since 2015 to promote digital transformation and innovation in manufacturing. Government initiatives can catalyze industry-wide adoption of new technologies

### Collaboration is Key<sup>[4]</sup>

The establishment of the "Platform Industries 4.0" has united over 300 companies and research institutions to foster knowledge sharing and standardization. Collaborative models enhance innovation and accelerate technology implementation

### Focus on SMEs<sup>[5]</sup>

The initiative promotes the adoption of Industry 4.0 technologies among SMEs, which are often less prepared for technological adjustments. Tailored support can enhance their competitiveness. Supporting SMEs is crucial for maintaining a balanced industrial ecosystem

### Investment in Workforce Skills<sup>[6]</sup>

Germany has launched initiatives to develop new skills among workers to ensure they can transition into new roles created by Industry 4.0. Continuous training is essential for a skilled workforce. Workforce development is key to mitigating job displacement due to automation



# GLOBAL LESSONS IN INDUSTRY 4.0

## UNITED STATES

### Innovation Ecosystem<sup>[7]</sup>

The U.S. has fostered a robust innovation ecosystem that encourages startups through access to venture capital, research institutions, and technology hubs such as Silicon Valley. A supportive environment is critical for rapid experimentation and scaling of new technologies.

### Focus on Cybersecurity<sup>[9]</sup>

As industries become more connected, cybersecurity has emerged as a critical concern, emphasizing the importance of securing digital infrastructure against cyber threats. Comprehensive strategies are essential for safe implementation of Industry 4.0 technologies. Cybersecurity must be prioritized to protect sensitive data and maintain trust in digital systems.

### Private Sector Leadership<sup>[8]</sup>

Many advancements in Industry 4.0 have come from private sector initiatives, with companies like GE and Siemens leading the charge in adopting digital manufacturing technologies. Public-private partnerships drive innovation effectively. Strong leadership from the private sector can accelerate technological adoption.

### Investment in Research & Development (R&D)<sup>[10]</sup>

The U.S. government and private sector invest heavily in R&D to foster innovation in emerging technologies, ensuring that the country remains at the forefront of technological advancements in manufacturing and beyond. Sustained investment in R&D is crucial for long-term competitiveness and innovation leadership.



# GLOBAL LESSONS IN INDUSTRY 4.0

## CHINA

### Government-Driven Initiatives<sup>[11]</sup>

China's "Made in China 2025" initiative aims to transform the country into a global manufacturing powerhouse by integrating advanced technologies into production processes, ensuring alignment with national goals and industry capabilities. Government-led initiatives can effectively drive national industrial transformation efforts.

### Emphasis on Data Utilization<sup>[13]</sup>

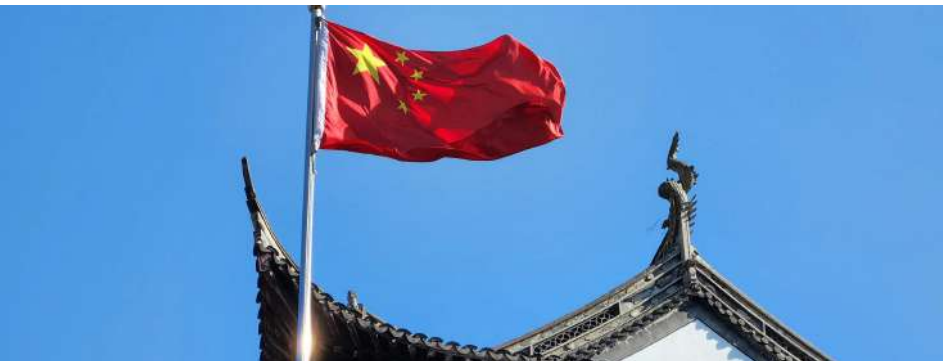
Chinese firms leverage vast amounts of data generated from connected devices to optimize operations and improve decision-making processes, highlighting the importance of effective data management strategies in realizing the full potential of Industry 4.0 solutions. Effective data utilization is critical for operational efficiency and informed decision-making in manufacturing environments.

### Rapid Adoption of Technologies<sup>[12]</sup>

Chinese companies have demonstrated an ability to rapidly adopt and scale new technologies due to significant government support and investment, serving as a model for other countries looking to accelerate their transitions into Industry 4.0. Agility in technology adoption can position countries as leaders in the Industry 4.0 space.

### Investment in Smart Manufacturing Technologies<sup>[14]</sup>

The Chinese government has invested heavily in smart manufacturing technologies such as robotics and AI to modernize its industrial base, enhancing productivity across various sectors. Strategic investments can significantly elevate a country's manufacturing capabilities.



# THE ROUNDTABLE HIGHLIGHTS

The roundtable discussions were convened to explore critical aspects of the Indian startup ecosystem, particularly in the context of Industry 4.0. Held on [insert date] at [insert location], this event brought together a diverse group of participants, including seasoned venture capitalists (VCs), industry experts, and entrepreneurs. The primary focus was to examine whether startups should tailor their products for the Indian market or pursue global scalability, a question that resonates deeply within the current landscape of digital transformation.



## Purpose and Objectives

The primary objective of the roundtable was to facilitate an open dialogue among stakeholders about the opportunities and challenges that startups face in India's rapidly evolving Industry 4.0 landscape. With increasing interest from investors and a growing number of startups entering the space, it was essential to discuss strategic decisions regarding product development, market entry, and investment timing.

## Aim of Discussions

- Identify key themes shaping the future of Industry 4.0 in India.
- Provide insights into the strategic choices startups must make regarding their market approach.
- Explore the role of VCs in supporting startups through mentorship and funding.
- Highlight the importance of collaboration between government, industry, and academia to foster innovation.

# FOCUS AREAS OF DISCUSSION

Q1: Should startups focus on developing products specifically for the Indian market, or aim for a broader global audience?

## Local Market Opportunities

- India's diverse customer base provides startups with a unique testing ground for innovative solutions.
- Tailoring products for local needs allows startups to refine offerings and gain valuable insights into regional preferences.
- Examples: Zebra Medical Vision, which tailors its AI-driven healthcare solutions for Indian healthcare providers, demonstrates the success of local adaptation.

## Hybrid Approach

- The consensus among investors and entrepreneurs leans toward a hybrid strategy: focus on solving local problems while ensuring the product can scale internationally.
- This approach allows startups to mitigate risks by starting in a familiar market while positioning themselves for global expansion.

## Global Scalability

- Investors stress the importance of designing products that can scale internationally, aiming for global reach and revenue.
- Products that can be adapted for global markets allow startups to tap into larger potential customer bases and revenue streams.
- Example: Niramai, with its AI-based breast cancer screening solution, has expanded beyond India to other countries facing similar healthcare challenges.

## Key Insights

- India's heterogeneity makes it an ideal market for piloting new products, which can later be scaled internationally.
- Developing scalable products from the beginning ensures that startups can compete in global markets, attracting international investment and customers.





## Q2: When is the optimal time for investors to back Industry 4.0 startups?

### Early-Stage Investment Potential

- Many investors believe early-stage investments can offer substantial returns, especially as the Industry 4.0 market grows rapidly (CAGR of 23.48%)
- Backing startups early allows investors to capitalize on emerging technologies before they achieve mass adoption
- Examples: Startups in AI, IoT, and robotics, though still in early stages, can demonstrate high growth potential in the long run
- Example: Successfully completing pilot projects or securing collaborations with large clients significantly enhances investor confidence. These achievements validate the startup's technology and demonstrate a strong understanding of customer needs, boosting investor appeal across all funding stages – from seed rounds to later-stage investments.

### Key Insights

### Market Readiness

- Investors emphasized the importance of ensuring that startups are ready for market before committing substantial investment
- Assessing product-market fit, securing initial customers, and demonstrating traction are critical indicators of readiness for investment.
- The debate revolves around balancing the high potential of early-stage investments with the risks involved.
- Identifying when startups are ready for investment—based on market fit, customer traction, and initial success—mitigates investment risks.

## Q3: How do risks evolve across different investment stages (Seed, Series A, B)?

- Startups that have achieved early traction—such as securing initial customers, partnerships, or pilot projects—are seen as lower risk by investors
- Traction validates the technology and demonstrates that there is market demand for the product.
- Examples: Early customer adoption and completed pilots are often seen as significant milestones that reduce perceived risks.
- Investors highlight that risk profiles differ across funding stages
- Early-stage investments (Seed and Series A) are generally higher-risk but can yield high returns if successful.
- Later-stage investments (Series B and beyond) focus on startups with more established business models, customers, and revenue streams, reducing risk.

### Key Insights

- Risk tolerance tends to be higher in the early stages, with investors willing to take on more risk in exchange for higher rewards
- As startups mature, risks reduce, and investors prefer more predictable revenue streams and business stability.

## Q4: Do investors prefer software or hardware startups within Industry 4.0?

### Software Advantages

- Investors typically favor software startups due to lower capital requirements and faster scalability
- Software solutions can more easily pivot and scale to meet market demands, offering quicker returns
- Example: AI, cloud solutions, and SaaS businesses have shorter time-to-market and fewer upfront costs, making them attractive to VCs.



### Hardware Innovations

- Despite the higher capital demands and longer timelines, hardware innovations are essential in specific sectors, particularly manufacturing, logistics, and automation
- Companies like GreyOrange, specializing in robotics for warehouse automation, prove that hardware startups can still be highly attractive if they meet market needs.

### Key Insights

- Software startups generally offer more scalability and lower risk, making them a preferred choice for investors
- However, hardware startups remain essential for certain industries where physical systems and innovations are necessary for advancements.

## Q5: What support beyond capital do startups need from investors?

### Mentorship and Guidance

- Startups benefit significantly from mentorship that helps navigate regulatory landscapes, develop go-to-market strategies, and avoid common pitfalls.
- Investors who provide more than just capital—offering expertise, strategic advice, and insight into industry best practices—can significantly increase a startup's chances of success.
- Example: Investors providing access to experienced mentors can help startups steer through complex legal and operational challenges.

### Networking Opportunities

- Access to networks is critical, allowing startups to find potential partners, clients, and customers. Investors who actively connect their portfolio companies with these networks can help startups scale faster
- Example: Investors can introduce startups to corporates, other VCs, or research institutions, facilitating valuable collaborations and growth opportunities.

### Key Insights

Successful startups require more than financial investment—they also need mentorship, networking, and strategic guidance to ensure sustained growth and market relevance.

## Q6: What are the main hesitations investors have when backing Industry 4.0 startups?

### ROI Uncertainties

- Investors are often uncertain about the ROI from hardware-heavy startups, which typically have longer timelines to profitability compared to software solutions
- The unpredictability of hardware development and the extended timelines required for bringing products to market contribute to investor hesitations.

### Key Insights

- Investors' hesitations stem from the long development cycles of hardware startups and the unpredictability of future market needs
- Strategies to address these concerns include better transparency, more detailed market validation, and clear product-market fit indicators.

### Market Dynamics

- Rapid technological advancements and shifts in market demands make it challenging for investors to predict which startups will succeed in the long term
- Without clear metrics or demonstrated market validation, investors are hesitant to commit substantial funds.

## Q7: What are the risks and implications of offering free pilot programs?

### Resource Depletion Risks

- While free pilots can provide startups with exposure, they often lead to significant resource depletion without guaranteeing contracts or follow-up revenue
- Startups may find themselves investing substantial time, money, and effort into pilots without securing future business or partnerships.

### Shift Towards Paid Pilots

- There's a growing preference for paid pilot programs to ensure financial sustainability and align incentives between startups and clients
- Paid pilots validate the technology while generating revenue, helping to sustain the business model of startups in the early stages.

- Example: Paid pilots create a more sustainable business model and help startups manage cash flow more effectively.

### Key Insights

- Offering free pilots can be a double-edged sword, serving as an entry point while also depleting resources without guaranteed returns
- Shifting to paid pilots ensures that both startups and clients have skin in the game, making the relationship more mutually beneficial.



#### Q8: How can industry-academia collaboration drive innovation in Industry 4.0?

- Collaborations between industry and academic institutions can accelerate talent development, ensuring that students have both theoretical knowledge and practical experience
- Innovation hubs or incubators within universities can facilitate joint research projects, internships, and curriculum development tailored to emerging technologies, bridging the gap between academic research and industry needs.

#### Q9: Are current regulatory frameworks industry 4.0-ready?

- India needs to adapt its regulatory frameworks to foster innovation while ensuring safety and compliance
- Sandbox environments can allow startups to test new technologies under regulatory oversight, helping both startups and regulators learn and adapt
- Learning from global ecosystems that harmonize regulations with technological advancements can help India create an adaptive regulatory environment.

#### Q10: How can Industry 4.0 solutions be tailored for rural sectors in India?

- Industry 4.0 solutions can democratize access to technology by offering affordable IoT solutions or mobile applications that provide rural entrepreneurs with data-driven insights
- Collaborations with local governments and NGOs can help educate rural communities and create awareness about the benefits of these technologies.

#### Q11: How can startups incorporate sustainability into their business models?

- Startups should integrate sustainability by focusing on circular economy principles and designing products that minimize waste
- Industry 4.0 technologies can contribute to India's net-zero goals by optimizing resource use and reducing environmental impact.



# THE BIG QUESTIONS

Category	Questions	Consensus & Key Insights
Market Orientation	Should startups focus on developing products specifically for the Indian market, or aim for a broader global audience?	The consensus leaned towards a hybrid approach: startups should initially address local needs while ensuring scalability for global markets. India's diverse market offers valuable testing grounds for innovative solutions.
Market Orientation	How can startups effectively balance local customization with global scalability?	Startups should leverage local insights to refine their offerings before adapting them for international markets, ensuring they are well-prepared to compete globally.
Investment Timing	When is the optimal time for investors to back Industry 4.0 startups?	Early-stage investments present high potential returns, but assessing market readiness and product-market fit is essential to mitigate risks associated with early backing.
Investment Timing	What specific indicators signal market readiness for potential investors?	Clear indicators include successful pilot projects, initial customer traction, and demonstrated product-market fit, which lower perceived investment risks.
Risk Assessment	How do risks evolve across different investment stages (Seed, Series A, B)?	Risk tolerance is generally higher in early stages; as startups mature and establish revenue streams, investors prefer lower-risk profiles with predictable returns.
Risk Assessment	What specific metrics should startups focus on to reduce perceived investment risks?	Metrics such as customer acquisition cost (CAC), lifetime value (LTV), and churn rate are critical for assessing risk and demonstrating growth potential to investors.
Hardware vs Software	Do investors prefer software or hardware startups within Industry 4.0?	Investors typically favor software startups due to lower capital requirements and faster scalability; however, hardware innovations remain essential in sectors like manufacturing and logistics.
Hardware vs Software	How can hardware startups effectively communicate their long-term value proposition to investors?	Hardware startups should emphasize their unique selling points such as durability, integration capabilities, and long-term cost savings to attract investor interest.
Support Beyond Capital	What support beyond capital do startups need from investors?	Startups require mentorship, access to industry networks, and strategic guidance to navigate challenges and enhance their chances of success beyond just financial backing.

Category	Questions	Consensus & Key Insights
Support Beyond Capital	How can mentorship programs be structured to maximize impact?	Effective mentorship programs should include regular check-ins, tailored advice based on industry best practices, and opportunities for networking with other industry leaders.
Investor Hesitations	What are the main hesitations investors have when backing Industry 4.0 startups?	Investors hesitate due to uncertainties around ROI, particularly with hardware-heavy startups that have longer timelines to profitability compared to software solutions.
Investor Hesitations	What benchmarks should be established for measuring ROI in Industry 4.0 investments?	Benchmarks should include both qualitative measures (customer satisfaction) and quantitative metrics (revenue growth) to provide a comprehensive view of investment performance.
Free Pilots	What are the risks and implications of offering free pilot programs?	While free pilots can provide exposure to potential clients, they often lead to resource depletion without guaranteed contracts; a shift towards paid pilots is recommended for sustainability.
Free Pilots	What criteria should be used to determine whether a pilot program should be free or paid?	The decision should consider factors such as resource availability, client engagement potential, and long-term business sustainability when deciding on pilot structures.
Industry-Academia Collaboration	How can collaborations between industries and academic institutions drive innovation in Industry 4.0?	Collaborations can accelerate talent development by aligning academic research with industry needs through internships and joint projects; creating innovation hubs can facilitate this collaboration effectively.
Regulatory Frameworks	Are current regulatory frameworks Industry 4.0-ready?	India needs adaptive regulatory frameworks that encourage innovation while ensuring safety; sandbox environments can allow startups to test new technologies under regulatory oversight.



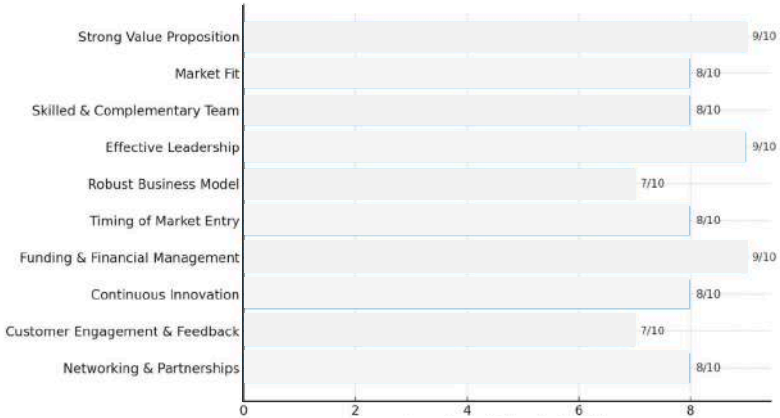


# WINNING FORMULA

Based on the analysis of the startups listed in the previous sections and insights from various sources on startup success factors, several key metrics emerge as critical for the success of Industry 4.0 startups. These metrics encompass aspects related to the business idea, team composition, execution strategy, and market conditions. Below is a detailed examination of these success metrics.

Success Metric	Description	Importance
Strong Value Proposition	The startup must offer a unique solution that addresses a specific market need or problem.	A compelling value proposition differentiates the startup from competitors and attracts customers.
Market Fit	The product or service should align well with market demands and customer expectations.	Achieving product-market fit ensures that there is sufficient demand for the offering, reducing risk.
Skilled and Complementary Team	A diverse team with complementary skills (technical, marketing, operations) is essential.	A strong team can drive innovation, execute strategies effectively, and adapt to challenges quickly.
Effective Leadership	Leadership quality significantly impacts strategic decision-making and team motivation.	Good leadership fosters a positive culture, aligns team efforts towards common goals, and drives growth.
Robust Business Model	The startup should have a clear business model that outlines revenue streams and cost structures.	A well-defined business model is crucial for sustainability and profitability in the competitive landscape.
Timing of Market Entry	Launching the product at the right time when customer readiness aligns with market conditions.	Proper timing can enhance adoption rates and ensure that the startup capitalizes on emerging trends.
Funding and Financial Management	Adequate funding to support operations and growth initiatives while maintaining financial discipline.	Access to funding enables startups to invest in technology development, marketing, and scaling efforts.
Continuous Innovation	The ability to innovate continually in response to market changes and technological advancements.	Sustained innovation keeps the startup relevant and competitive in a rapidly evolving Industry 4.0 landscape.
Customer Engagement and Feedback	Actively engaging with customers to gather feedback for continuous improvement of products/services.	Customer insights help refine offerings, enhance satisfaction, and build loyalty over time.
Networking & Partnerships	Building relationships with industry players, investors, and mentors for support and collaboration.	Strong networks can provide access to resources, expertise, and opportunities that are vital for growth.

Key success metrics for Industry 4.0 Startups



# THE ROAD AHEAD

The insights gathered from the Industry 4.0 Investor Roundtable highlight the critical need for collaborative efforts among various stakeholders to foster a thriving ecosystem for Industry 4.0 technologies in India. This section outlines actionable recommendations tailored for government entities, investors, and startups to drive innovation, enhance competitiveness, and ensure sustainable growth in this transformative sector.

## FOR GOVERNMENT

### 1. Establish Clear Policies and Frameworks:

- The government must proactively establish clear and supportive policies and frameworks for Industry 4.0. This involves developing comprehensive regulations that provide clarity for start-ups, minimise compliance burdens, and ultimately enable them to succeed in the rapidly evolving market..

### 2. Promote Paid Pilot Programs:

- Encourage public sector units (PSUs) and large enterprises to engage in paid pilot programs with startups. This approach will not only validate innovative solutions but also provide startups with necessary revenue streams.

### 3. Create Centralised Access to Resources:

- Develop a centralised digital platform that consolidates information on government schemes, funding opportunities, and mentorship programs available for startups. This will enhance accessibility and streamline the support process.

### 4. Foster Public-Private Partnerships:

- Facilitate collaborations between government agencies and private sector players to drive research and development initiatives in Industry 4.0 technologies. Such partnerships can accelerate innovation and bring cutting-edge solutions to market more quickly.

### 5. Support Skill Development Initiatives:

- Invest in skill development programs aimed at equipping the workforce with the necessary skills to thrive in an Industry 4.0 environment. This includes training in data analytics, AI, IoT, and other relevant technologies.

## FOR INVESTORS

### 1. Adopt a Long-Term Investment Perspective:

- Shift focus towards long-term investments in deep tech sectors, recognizing that substantial returns may take time to materialize. This approach will encourage more sustainable growth within the startup ecosystem.

## **2. Provide Mentorship and Strategic Guidance:**

- Beyond financial investment, offer mentorship and strategic guidance to portfolio companies. Investors can leverage their industry experience to help startups navigate challenges and refine their business models.

## **3. Encourage Collaboration Among Startups:**

- Foster an environment where startups can collaborate on projects or share resources, particularly in areas like technology development or market access. This collaborative approach can enhance innovation and reduce costs.

## **4. Diversify Investment Portfolios:**

- Consider diversifying investment portfolios to include a mix of hardware and software startups within the Industry 4.0 space. This strategy can mitigate risks associated with market fluctuations while capitalising on various growth opportunities.

## **5. Engage with Government Initiatives:**

# **FOR SARTUPS**

## **1. Focus on Building Defensible IP:**

- Invest in developing strong intellectual property (IP) portfolios that protect innovations and create barriers to entry for competitors. Highlighting defensible IP can enhance credibility with potential investors.

## **2. Seek Paid Pilot Opportunities:**

- Shift away from offering free pilots and instead pursue paid pilot programs that ensure financial sustainability while demonstrating value to clients.

## **3. Master Storytelling and Communication:**

- Develop compelling narratives around products and solutions that clearly articulate their value propositions, market fit, and differentiation from competitors. Effective storytelling can significantly enhance investor interest.

## **4. Leverage Networks for Growth:**

- Actively seek out mentorship, partnerships, and networking opportunities within the Industry 4.0 ecosystem to gain insights, share resources, and expand market reach.

# REFERENCE LINKS

1. Industry 4.0 Overview
  - "What is Industry 4.0?" - [Industry 4.0 Definition and Components](#)
2. Market Size Projections
  - "Global Industry 4.0 Market Size" - [Market Research Report](#)
3. Indian Market Insights
  - "NASSCOM Report on Digital Technologies" - [NASSCOM Digital Transformation Insights](#)
4. Investment Trends in Industry 4.0
  - "Venture Capital Funding in Industry 4.0" - [Investment Trends Analysis](#)
5. Notable Startups in the Space
  - "Top Startups in Industry 4.0" - [Startup Overview](#)
6. Germany's Industry 4.0 Initiatives
  - "Industrie 4.0 Initiative" - [German Government Support for Industry 4.0](#)
7. United States Innovation Ecosystem
  - "Innovation Ecosystem in the U.S." - [U.S. Technology and Innovation](#)
8. China's 'Made in China 2025' Initiative
  - "Made in China 2025 Overview" - [Chinese Government Initiatives](#)
9. Cybersecurity in Industry 4.0
  - "Importance of Cybersecurity in Industry 4.0" - [Cybersecurity Strategies](#)
10. Roundtable Discussion Highlights
  - "Insights from the Industry 4.0 Roundtable" - [Roundtable Summary](#)
11. Future Trends and Opportunities
  - "Future of Industry 4.0" - [Emerging Trends and Insights](#)

## REFERENCES [1]

1. Siemens AG (2020). "Digitalization in Manufacturing: A Case Study on Productivity." Retrieved from [Siemens](#).
2. General Electric (2019). "GE Digital: Transforming Industry with Data." Retrieved from [GE Digital](#).
3. Bosch Group (2021). "Predictive Maintenance: The Future of Manufacturing." Retrieved from [Bosch](#).
4. Federal Ministry for Economic Affairs and Energy (Germany) (2019). "Industrie 4.0: The German Government's Strategy." Retrieved from [BMWi](#).
5. Nike Inc. (2021). "How Nike Uses Data Analytics for Personalized Marketing." Retrieved from [Nike News](#).
6. Unilever (2020). "Sustainable Manufacturing: Our Approach." Retrieved from [Unilever](#).

1. Senseye (2022). "Predictive Maintenance Software." Retrieved from [Senseye](#).
2. MachineMetrics (2022). "Real-time Machine Data Analytics." Retrieved from [MachineMetrics](#).
3. Altizon (2022). "Industrial IoT Platform." Retrieved from [Altizon](#).
4. Akselos (2022). "Digital Twin Technology." Retrieved from [Akselos](#).
5. Siemens Digital Industries (2022). "Digital Twin Solutions." Retrieved from [Siemens](#).
6. Wipro (2022). "Digital Twin Solutions." Retrieved from [Wipro](#).
7. FogHorn (2022). "Edge Intelligence Solutions." Retrieved from [FogHorn](#).
8. Litmus (2022). "Edge Data Platform." Retrieved from [Litmus](#).
9. Locus.sh (2022). "AI-Powered Logistics Optimization." Retrieved from [Locus](#).
10. Seebo (2022). "Process-Centric AI for Manufacturing." Retrieved from [Seebo](#).
11. Quartic.ai (2022). "AI-Powered Process Manufacturing." Retrieved from [Quartic.ai](#).
12. Gramener (2022). "Data Analytics for Manufacturing." Retrieved from [Gramener](#).
13. BrightMachines (2022). "Automated Assembly Solutions." Retrieved from [BrightMachines](#).
14. Righthand Robotics (2022). "Robotics Solutions for Warehouse Automation." Retrieved from [Righthand Robotics](#).
15. GreyOrange (2022). "Robotics and Automation Solutions." Retrieved from [GreyOrange](#).
16. Verusen (2022). "AI-Driven Supply Chain Management." Retrieved from [Verusen](#).
17. Highbyte (2022). "Industrial DataOps Software." Retrieved from [Highbyte](#).
18. Zebra Technologies (2022). "Supply Chain Solutions." Retrieved from [Zebra Technologies](#).
19. Augmentir (2022). "Augmented Reality Solutions for Training." Retrieved from [Augmentir](#).
20. Sightsync (2022). "AR Solutions for Industrial Training." Retrieved from [Sightsync](#).

**Reference [3]** [BMWi](#)

**Reference [4]** [Plattform Industrie 4.0](#)

**Reference [5]** Kinkel, S., & Maloca, S. (2009). "Drivers and Barriers of Manufacturing Innovation." International Journal of Technology Management

**Reference [6]** World Economic Forum (2020). "The Future of Jobs Report 2020." [WEF](#)

**Reference [7]** U.S. Department of Commerce (2017). "The Innovation Ecosystem: A Framework for Growth." [DOC](#)

**Reference [8]** General Electric (GE) (2018). "How GE is Leading the Digital Industrial Revolution." [GE Reports](#)

**Reference [9]** U.S. Cybersecurity & Infrastructure Security Agency (CISA) (2021). "Cybersecurity for Industry 4.0." [CISA](#)

**Reference [10]** National Science Foundation (2021). "National Patterns of R&D Resources." [NSF](#)

**Reference [11]** State Council of China (2015). "Made in China 2025." [China Government](#)

**Reference [12]** McKinsey & Company (2021). "How Chinese Companies Are Adopting AI and Automation at Scale." [McKinsey](#)

**Reference [13]** Chen, J., et al. (2018). "Big Data Analytics in Manufacturing: A Review." Journal of Manufacturing Systems, 48, 19-29.

**Reference [14]** Zhang, Y., & Zhao, X. (2020). "Understanding China's 'Made in China 2025' Strategy: A Policy Perspective." China Economic Journal, 13(2), 132-150.



### Panel Moderators

- Dr. Anshul Vikram Pandey, PhD  
Founder And Chairman - PanScience Innovations (PSI)
- Sudhanshu Mittal - Head And Director  
Technical Solutions - NASSCOM

### Panelists

- Shantanu Gaur (Meity - NASSCOM Centre Of Excellence)
- Vikas Jain (Svar Renewables)
- Vivek Datt (Third Eye Ai - JBM Group Company)
- Krishna Dev Pathak (Boon Capital Advisors)
- Divyam Duggal (Invest India)
- Ish Anand (iCapital Ventures)
- Vikram Upadhyaya (Mobility & Automobile Innovation Lab)
- Dr Vibhuti Aggarwal (Realtime Angel Fund And Fluid Ventures)

### Organising Team

#### PanScience Innovations

- Tanisha Singh - Head of Operations
- Fella Fajar - Operations Team
- Arghyadeep Das - Media Team

#### Nasscom CoE-IoT

- Shalu Tyagi - Lead of Operations

### Designing Team

#### PanScience Innovations

- Ibrahim
- Suhani

**For more information please visit:**

[www.panscience.xyz](http://www.panscience.xyz)

[www.coe-iot.com](http://www.coe-iot.com)