The New Competitive Edge in Manufacturing:

Understanding the Journey to Digital Lighthouses

AN A&M POV

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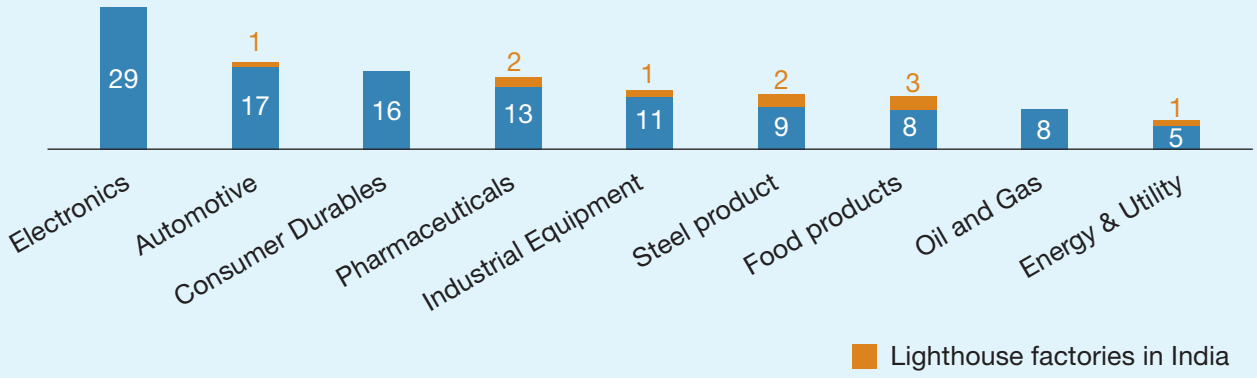
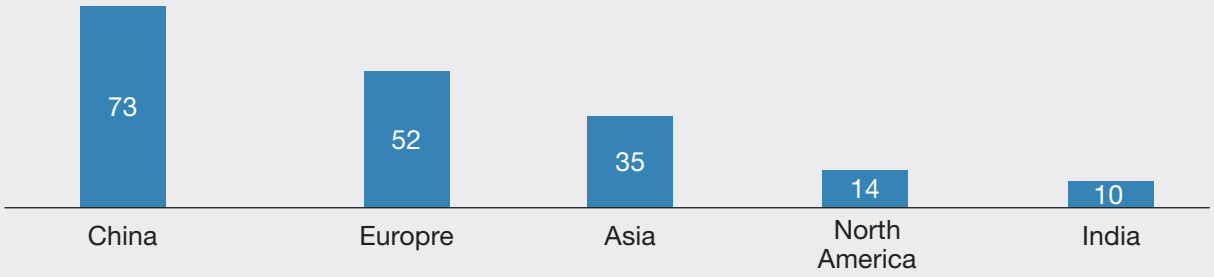
India's manufacturing sector, contributing nearly 17% to its GDP and employing over 60 million workers, stands as a cornerstone of the country's economic ambitions[1,2]. A major credit of this growth can be attributed to the government's flagship programs such as Make in India, Atmanirbhar Bharat, and the Production Linked Incentive (PLI) schemes[3], that have catalyzed capacity expansion and investment. Yet, global supply chain realignments and the rapid evolution of Industry 4.0 technologies, such as AI, IoT, and big data, have underscored a critical reality: India's competitiveness now depends on the speed and scale of digital adoption.

Electronics and Automotive Lead Digital Adoption Globally[4]



69% Lighthouse factories are in China and Europe[4]



Recognized by the World Economic Forum for successfully applying and integrating Fourth Industrial Revolution (4IR) technologies, at scale, a lighthouse factory is efficient, competitive, and sustainable. India is currently home to 10 such factories— Cipla, CEAT, Tata Steel Jamshedpur and Kalinganagar, Unilever Tinsukia and Silvassa, Schneider Electric, Dr Readdy's Labs, Mondelez Sri City, ReNew Power Karnataka.

A Journey to a **Lighthouse Factory**

The path to becoming a Lighthouse factory typically progresses through three stages of digital maturity:

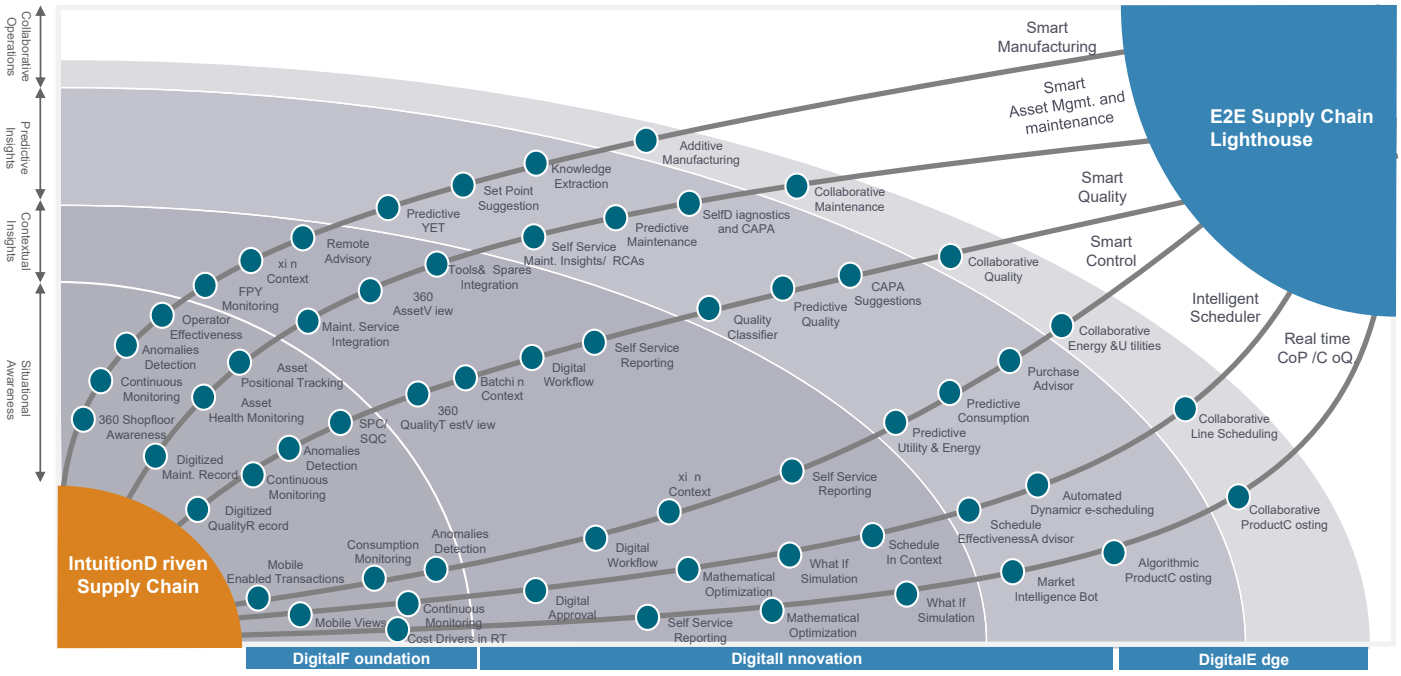
> Creating Lighthouse factory is not just about digitalizing manufacturing operations, it is also about enhancing enterprise-wide visibility and empowering teams to take real time, data led decisions
>
> – **Sameer Amte**, Managing Director

Stage 1 – Digital Foundation: Core processes such as planning, procurement, and operations are digitized. Smart sensors and basic automation improve transparency, reduce downtime, and lift efficiency. This stage represents nearly 70% of most companies' digital investment[5]

Stage 2 – Digital Innovation: Operational technology and enterprise IT systems are integrated. Centralized data enables predictive analytics, disruption simulation, and optimized resource allocation.

Stage 3 – Digital Edge: Companies leverage AI, ML, and digital twins to enable autonomous decision-making. Real-time insights drive end-to-end optimization across the value chain. Globally, fewer than 10% of organizations operate at this level[5]

Through progressive technology adoption, the journey from an intuition-driven factory to a lighthouse is illustrated in the infographic below[5]

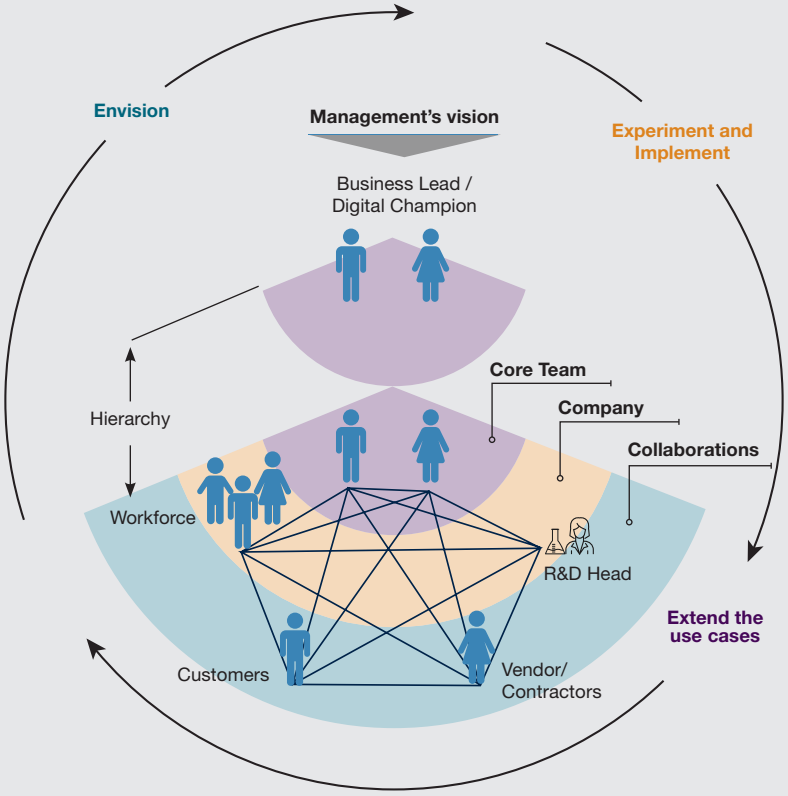


> Digital transformation initiatives frequently fall short due to flawed implementation approaches. The key is to treat digital transformation as a strategic business case, with measurable ROI and clear accountability
>
> **– Praveen Pajiar**, Managing Director

Success in this journey requires a blend of **manufacturing functional expertise, digital capability, analytics expertise, IT integration and a strong strategy and change management**

Below infographic represents this[5]

3 E's helping the factories achieve Lighthouse status



Success Factors

Digital Champion to translate management's vision to reality by connecting business needs and acting as change agents to drive adoption

Workforce Readiness through extensive training, investments in learning and development programs

Network of Partners to test and accelerate new capabilities and build scalable solutions

Establishment of KPIs to assess and report the impact of the above use cases

Some of the top use cases are outlined in the table below

Industry	Top use cases	Impact
Pharma and Medical Products	• Real-time asset monitoring • Digital twins for production scheduling • IIoT based energy consumption optimization • Autonomous labs & molecule screening	• 50%-90% productivity • 15% - 25% yield • 40%-50% quality deviation • 20%-25% faster drug development
Consumer Packaged Goods	• Real-time asset monitoring • Advanced IIoT for process optimization • Predictive maintenance based on historical data • Advanced analytics enabled ESG tracking	• 25%-30% yield • 25% productivity • 60-70% MTBF • 10%-20% GHG emissions
Automotive	• Advanced analytics-based cycle time optimization • Digitally enabled scrap monitoring with in-built RCA • Motion detection-based line balance optimization • Blockchain for traceability	• 20-30% OEE • 50% scrap reduction • 20-30% cycle time • 30% lower maintenance costs
Consumer Durables	• Digital twin for design failure detection • Adaptive optical inspection • Automated root cause analyzer in aftersales • AI-powered process control for energy	• 60-65% inspection efficiency • 50% assembly efficiency • 35% on-site repair time • 30-35% energy consumption

Source: World Economic Forum Global Lighthouse Network

B Challenges on the way

The key challenges factories must overcome include limited investment support for emerging technologies, low readiness to embrace the change, capability gaps in integrating these technologies and rising risks around data privacy and cybersecurity.

Typical challenges

Lack of investment	Many factories may struggle to secure necessary funding to make large investments in technology, people and processes
Inertia to change	Implementing new technology and capabilities can be disruptive and may be met with resistance from the workforce or management
Skill gap	The transformation to an advanced manufacturing model may require new skills and expertise that may not be present within the current workforce It may be necessary to invest in training and upskilling programs to bridge this skills gap.
Absence of integration of legacy systems	Many factories have legacy systems that may not be compatible with new technology or processes. It may be necessary to invest in the integration solutions for seamless operations
Data Management	Advanced manufacturing relies on data analytics to drive insights and decision-making. Factories may struggle to manage and interpret the vast amounts of data generated by their operations
Increased regulatory compliance	Advanced manufacturing may require adherence to new or more stringent regulations, which can be challenging to navigate and comply with
Increased risk of Cybersecurity	As factories become more connected and rely more on technology, the risk of cybersecurity threats increases. It is important to invest in robust cybersecurity measures to protect against these threats

A&M's experience with manufacturing clients highlights five critical enablers for accelerating industrial digital transformation:

> "The digital journey must be mapped and owned by business leaders. Capability building and role-based accountability are essential to embed transformation across the organization"
>
> – **Kunwar Vijayant Singh**, Managing Director

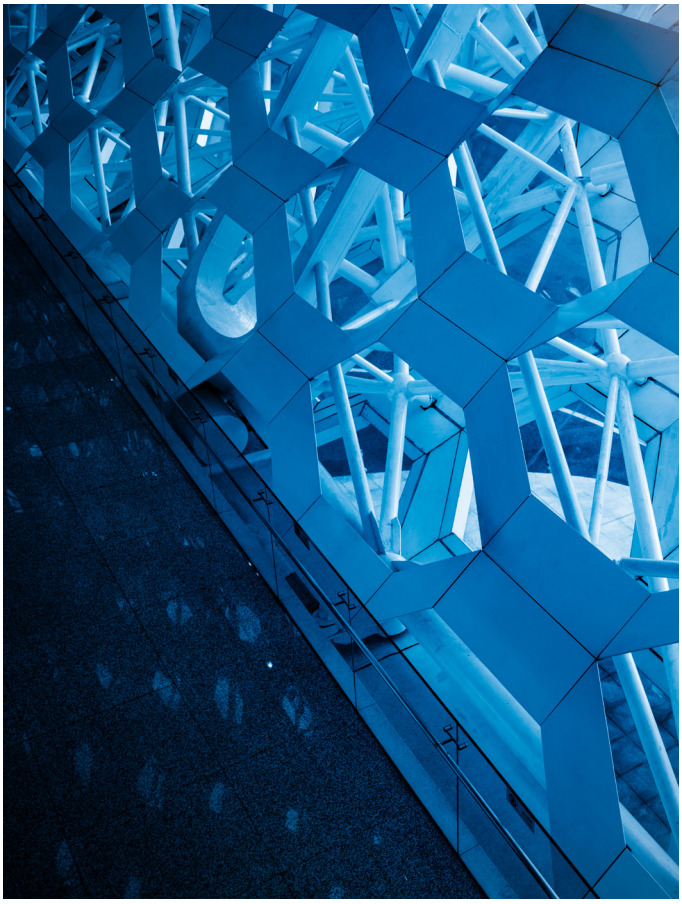
Leadership Ownership: Ensure digital transformation is led by business leaders—not confined to IT teams—and supported by governance and accountability frameworks.

Capability Building - Upskill operators, engineers, and middle managers in digital tools, analytics, and agile decision-making.

Continuous Improvement – Treat transformation as an iterative process, aligned to measurable performance goals, not a one-time project

Collaboration Ecosystem – Partner with technology providers, start-ups, and academia to co-develop solutions and scale pilots rapidly

Innovation pipeline – Maintain steady experimentation with new digital use cases to sustain value creation.



C The Next Frontier: **Sustainability and Scalability**

Sustainability:

Globally, 25 of 189 Lighthouse sites have evolved into Sustainable Lighthouses4, leveraging digital tools to reduce emissions, integrate renewables, and minimize waste. Indian manufacturers are beginning to adopt similar frameworks, linking ESG outcomes to digital KPIs5

Scalability

Equally critical is the ability to replicate Lighthouse practices across multiple sites. For instance, Schneider Electric, after its Le Vaudreuil site, recognized as a Lighthouse in 2018 , has expanded to seven certified sites globally, including one in India, demonstrating that structured replication amplifies impact[6].

The Lighthouse journey in India demonstrates that digital adoption in manufacturing is no longer optional but a strategic imperative for competitiveness and resilience. As organizations embrace this transformation, they must balance efficiency gains with sustainability and scalability. The road ahead requires collaboration across industry, government, and technology providers to accelerate adoption and create impact at scale as India's manufacturing sector redefines its global position.

Sources

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