Post Pandemic Business Industry 4.0 Roadmap

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Introduction

Global manufacturing and supply chains continue to be impacted by the COVID19 pandemic. Though a lot of factories & logistics providers are seeking to resume operations, they continue to face labor shortage, procurement & transportation delays and regulatory uncertainties.

Industry4.0 from Tech Mahindra entailed calibrating a new normal in which industries will adopt I4.0 more or less, the effected countries, the capex investment, the use cases to be considered, Impact on employment, cost savings and adoption of new technologies for revival post lockdown.

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1. Post COVID which industry segments are expected to adopt I4.0 and which may adopt not?

Industry Trend:

- **Automotive:** The automotive production volume of 2022 is expected to be equal to production volume of 2019. However, the product mix is accelerating towards **30%** EV by 2025. This demands big shift in capacity from IC to EV
- **Pharma:** This Industry produces **20bn+** vaccination dosage for **7bn+** population across the globe, Which demands for local production. The industry is expected to control current SCM **cost of 50%** in the product production.
- **Aero & Defense:** The pre COVID production backlog of **10 years** will ease for a short term, this is expected to put pressure again by 2022. The Aero Defense manufacturing digitization is developing at a faster pace
- **Chemical & Industrial**: There is a big pressure on **Cost & SCM**. The industry did not deliver productivity gain in the last 10 years. 2.7 times compliance
- **Electronics**: There is no significant change

Manufacturing Companies:

The top Aero OEM & T1 ecosystem in Europe are investing in I4.0

The leading Pharma company is investing in SCM 4.0 & integrated Manufacturing with R&D

TechM PoV:

Auto, Pharma, Chemical Process are the top industries to adopt I4.0

Aero is the mid segment industry to adopt I4.0

Distributed Greenfield : Electronics (also impacted due to US-China trade war)

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2. Post COVID, which countries is expected to adopt I4.0 and which may not?

Country Trend:

- **China** has world's largest manufacturing workforce with over 120 million people and 4 trillion manufacturing businesses. China's productivity is $30K per person.
- **India** manufacturing workforce 43 million people and $412bn manufacturing businesses. India's productivity is $10K per person.
- **Germany** per person productivity is $65K. The productivity is more compared to Asian countries due to investments in Robotics and Automation by the western countries
- This is validated by the fact that the Robot density in Japan is 30 per 1000 people, in China it is 10 per 1000 people and in India 2 per 1000 people
- Therefore the world is focusing more on Robotics and Automation projects like sensorization, IoT, 5G connectivity, IT-OT integration etc…

Manufacturing Companies:

1. European car manufacturer is investing on wireless & automated projects for their china plant
2. An American manufacturer's Germany plant is focusing on robotics & automated projects
3. India & Vietnam countries is expected to gain new manufacturing set up for Pharma, Electronics, Infrastructure. However, they will not build the Factory-SCM same as what they built in the last 30 years

TechM PoV:

Courtiers like Germany, China, Japan, USA will further scale to adopt 5G, AI, Robots in their I4.0 journey

India & New Manufacturing hubs will need to lower their cost Digital Solutions. The interface of Human – Machine will be critical.

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3. Industry 4.0 is a capex investment, will companies be interested to take the I4.0 journey ahead?

Industry Trend:

- The year 2020 is a wash out on revenue-profitability due to the current pandemic situation – Covid-19.
- This demands strategic investments in Product-Production-Performance areas and requires a healthy profitability & reserves for the companies.
- Hence most of the companies will invest Capex in new product development & related production engineering sectors. The companies are investing 6-7% of the budget, almost no budget cut in COVID situation
- This situation is demanding I4.0 to shift to the OPEX model

Manufacturing Companies:

European car manufacturer is investing into eMobility journey

Large chemical manufacturer from Europe is investing on Integrated manufacturing journey and already working on the pilot

TechM PoV:

We are experiencing that Manufacturing companies have floated I4.0 RFPs accepting the solution on the cloud

Tech Industry offering cloud based OPEX model and SaaS, Agile model for deployment

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4. In post COVID era, what are the top use cases in consideration for I4.0?

Industry Trend:

- Manufacturing companies will spend on IT-OT integration which is to be greater than $100bn by the year 2027.
- The high spend areas will be in robotics & automation with 60% coming from APAC region.
- Followed by the analytics Use-cases in production & supply chain areas. Also there will significantly higher spent on AI/ML use cases from the European region.
- Automotive Industry is expected to automate further in robotics areas with more than 50% of overall spend in the US region.

Manufacturers:

2 large Asian automotive manufacturers from Japan and Korea are entering into robotics market areas

European car manufacturer is developing AI-enhanced robots for material handling and transport

TechM PoV:

We believe outcome-based delivery models to mature especially in the production engineering space

Security use cases would scale up which remained a hurdle in integrating IT & OT.

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5. Robotics-Automation-I4.0, impact on employment, how countries expected to take this?

Industry Trend:

- The robot density in Germany is 32, US is 20, Japan is 30, Denmark is 23, China is 10, India is 2 per 1000 people
- In the next 10 years, China plans to put more than 14 million Robots to work.
- In Europe more than 21 million workforce is to be effected by robotics and automation journey. On other hand in US, the expected gap of 3 million unfilled positions of different skill sets in the next 8 years time frame
- European Commission has setup a 9.2Billion Euro program for digital where 1 major program is on re-skilling. 34 % of US Manufacturers are focused towards Reskilling towards AI/ Robotics skills.

Manufacturers:

A construction equipment company is partnering with high schools to provide pre-employment training on AI/ ML skill sets

German Industrial Goods company utilizing AR based technology to re-skill people, on job training for 24000 engineers.

TechM PoV:

Digital Technology enabling re-skilling and helping in the standardization of business process across locations

Earlier the re-skilling was mostly internal training programs of the companies but now extending capacity to schools/colleges

There will be Factory shopfloor job reduction due to robotics and automation and Product-Production Engineering job are increasing due to re-skilling programs

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6. To help companies save cost and also adopt I.40 future technologies, what's your suggestion on business case approach?

Industry Trend:

- Pre-COVID 3-5 year back the most of the manufacturers business case was driven by asset efficiency like how better my asset utilization? what is the uptime? what is the energy cost? etc., which was incremental benefit and gradual change for the manufacturers
- Post-COVID the manufacturers are focusing on secure-flexible SCM, Distributed Factories, containing supplier vulnerability, Shop floor & Warehouses automation
- Resulting in the business case that revolves around 15-20 % improvement in Operational Efficiency Effectiveness, 8-10% reduction in hidden factory cost and 30-40% reduction in rework and scrap which has high acceptability and funding from the manufacturers.

Customer:

Heavy truck and car manufacturers are simultaneously looking to invest into I4.0 technologies in brownfield and green filed plants to gain substantial competitive advantage.

Aero Industry is focusing on SCM – Supplier viability business case

TechM PoV:

Any project undertaken in the future should have less than 1 year RoI cycle

It is a federated business case and sponsorship which is happening across the world

Focus on roadmap of experimentation at the intersection of business goals and technology readiness

To have Plow-Back model. First save & then invest on new digital technologies

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7. How do I convert a business case into technology and investment plans? How do I ensure optimum investments?

Industry Trend:

I4.0 initiative business case typically involves multitude of new-age technologies. The directional businesses case for a typical mid-size program looks like this:

- 10-12% role played by Field devices (L0 devices, sensors..)
- IoT Platform, Predictive analytics Platform plays a role of 20-15%
- IT infra (cloud) plays a role of 10-12%
- 35-40% role played by Engineering services
- Organization change, re-skilling plays a role of 8-10%

Customer:

In Q1-FY 2021 we observed that I4.0 roadmap an implementation services RFPs from Manufacturing companies were in predictive plant maintenance, in plant logistics tracking and dynamic quality related areas.

TechM PoV:

Traditionally OT and IT were separated. To have OT – IT Integration the organization should go through the cultural shift. The brownfield plants from process & discrete manufacturing need to operate in 2-speed architecture. This needs complex enterprise architecture.

The technology investment needs to budgeted into 2 buckets:

a) Foundation investments like infrastructure, network, cloud, etc. to support the technology

b) Use case specific investments

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8. We hear a lot about 5G impact on I4.0 approach, what is it?

Industry Trend:

- Global 5G enabled Industry 4.0 market will reach $314.6 billion by the year 2030.
- 5G enabled IIoT devices is expected to reach 189.2 million units in the year 2030
- Demand for lower latency(<1ms), need for higher bandwidth(>1gbps), higher reliability & low cost of ownership has fueled investment in 5G
- 5G in I4.0 can enable multiple key use-cases such as AGV, Autonomous Robots, Remote Monitoring, Predictive Analytics
- Germany & other European nations are leading the way by investing in Industrial spectrum to help the business embark on digital journey

Manufacturers:

- German electronics manufacturer deployed 5G networks and undergoing testing for auto & electronics manufacturing industries
- Volvo CE has already tested remote - controlled machines and autonomous solutions using 5G technology

TechM PoV:

Investments in 5G Networks to enable industrialization of I4.0 use-cases

5G & SDWAN enable edge-cloud journey which leads to reduce 30% cost of ownership

Plow-Back model: Save on Industry infrastuture, MPLS network and then invest in the network of future

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9. What's TechM's advise for an approach for the mid size – small size firms?

Industry Trend:

- India's MSME sector is a backbone of its economy and contributes 45% to the Manufacturing segment and is the second biggest employer in the country after Agriculture segment. The COVID 19 stimulus that was announced by the Indian government is approximately $250Bn
- In Germany, small and medium-sized companies employ more than 16 million people and 30% of them are in Manufacturing segment
- Productivity-Efficiency of this segment is 20-35% less than the large OEM-T1 segment and their survival & scale up is important

Customers:

In India, CII's Samarth Udyog, Germany's Industrie 4.0 and IIC in US are specifically focused on helping the MSME to upgrade and scale up

TechM PoV:

The MSME is a fragile sector of manufacturing. The viability of this sectors has high impact on OEMs and their suppliers. MSME's ability to sustain and grow will depend upon their workforce re-skilling, productivity and their customer collaboration

MSME should leverage the sector revival financial package and invest into I4.0 technologies and scale up

Plow-Back model : Save on Industry infra, MPLS network and then invest in the network of future

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10. Our PoV on I4.0 approach with respect to people reskilling, behavior, OCM aspects.

Industry Trend:

- Manufacturing job creation will generate $45 million in next 10 years, out of which 40 % would need to be equipped with new digital skill sets.
- Risk of I4.0 skill shortage could impact $2 trillion dollar economic output in US alone, over the next 8 years.
- About 80% of manufacturing companies are willing to pay more than the market rates in workforce areas reeling under talent crisis
- The top skill sets that are expected to be essential are Robotics & Automation, Data Scientist, AI/ML, Cybersecurity and Digital tools

Society:

There are elements of society working on this reskilling program are

1. WEF has a Lighthouse Program for Industry 4.0
2. Industries 4.0, IIC, CII -Samarth Udyog from Germany, US and India

TechM PoV:

Redefine business with a single view across IT-OT organizations and deliver better efficiencies

Move towards utilizing Open talent eco-system

Define Digital Partner eco-system for the company and define the I4.0 journey

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11. Pre COVID & Post COVID, what's the difference in I4.0 approach?

Industry Trend:

Pre-COVID:

- Over 60-70% of I4.0 implementations focused on asset health monitoring, simulation, AR /VR in complex operations.

Post COVID:

- About 40-50% global conglomerates have over 50% of supply chain in china. So there is dependability in China, Hence focusing on building robust alternate supply chain in different other countries
- Use of AI / ML to reduce FST. errors by approximately 50% & reduce lost sales by 60% to secure demand and fulfill efficiently
- Re-skilling and up-skilling of workforce and shift in organization culture adopting new age technologies
- Digital manufacturing to accelerate new products introductions specially in the areas like digital thread, etc.

Customers:

1. Companies to move from CAPEX to OPEX model
2. Investments made in Cloud based solutions
3. Focusing on Cost take out and workforce security
4. Supply chain remodeling :SCM 4.0

TechM PoV:

Prioritize I4.0 initiatives based on cost take out and new launches

Invest into digitizing supply chain to improve its resilience

Focus on improving plant network security as plants are accepting more remote operations

Consider standard IoT platforms and build specific apps to scale up

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