The Future of Industry 4.0

The fourth industrial revolution is all about making business smarter and more automated. It focuses on deepening the impact of digital technologies by making machines more self-sufficient, communicate with one other and process massive data that humans can't, in order to promote efficiency and growth for the future. The industry 4.0 technology is characterized by 4 foundational technologies applied along the value chain. This includes:

1. **Connectivity, data, computational power** – Consider IoT, cloud technology, 5G and blockchain
2. **Analytics and Intelligence** – Includes machine learning and artificial intelligence
3. **Human machine interaction** – Consists of virtual and augmented reality, robotics and automation
4. **Advanced Engineering** – Includes 3D printing and prototyping, cyber-security renewable energy and nanoparticles

The Evolution of Industry 4.0

While the manufacturing sector has had early adopters for this, other industry segments like automotive, energy and mining have equally benefited from it. Specifically in the automotive industry, there has been a good use in the production process where repetitive and not ergonomics tasks are carried out through collaborative robotics. Computer vision is also being deployed to detect manufacturing defects, which reduces costs and acquires more value in the production chain eventually. Implementation of Industry 4.0 has been done in energy sector more for the treatment of large amounts of data.

Use of Big Data has allowed for optimization of use of energy, determine types of energy available at competitive costs and introduction of fossil fuels and biofuels. 3D bioprinting for the pharma and health sector has gained momentum, which combine to obtain tissues that have same properties as living tissues. Creation of 3D prostheses, and customization of this for each patient, has made a remarkable difference. A traditional sector like agrifood has been one of the last sectors to apply Industry 4.0 through use of drones to control fields through computer vision, or hyperspectral cameras for detection of stones or plastics when triage of fruits or vegetables is performed.

Industry 4.0 has opened up new perspectives for industrial development, for improving production, product quality and working conditions. From its introduction in the early 2010s, Industry 4.0 has made use of the following across European and US markets:

Scaling markets – Achieving greater competitiveness, inclusion and convergence in 'analog complements' like infrastructure, skills and logistics

Shaping commercial use of data – Giving relevance and importance to data privacy by taking over the challenges posed by artificial intelligence

Speeding technology adoption – Creating innovative pathways for small businesses to join the bandwagon through applied R&D and strengthening management capabilities, towards a digital catch-up

Application of Industry 4.0 Across Sectors

The extensive use of smart warehouses by online retail giants like Alibaba and Amazon, manned by 100s of robots, enable faster movement in the warehouses as they are wi-fi equipped and self-charging machines. They send goods to human workers who in turn order and arrange for delivery, thereby processing triple the work. New Doha International Airport developed an automated flight service cart system, for the process of testing facility that verifies all functions are in place as per specifications. This process can save companies substantial amount of time and money by modeling and optimize operations.

Beiersdorf of Germany, where Industry 4.0 first conceptualized, has digitized production enough to be called an i*ntelligent factory* by improving agility and flexibility. This has been made possible through consolidation of ERPs and in-house MES developments, leading to standardization of processes across sites. In the medical arena, an extensive use of 3D printing has been monetized. BCN3D Moveo Technologies has designed a robotic arm from scratch, developed by their engineers where the structure is fully printed using additive manufacturing technologies and its electronics are controlled by a software called Arduino.

REWO as a company has made a platform for knowledge, information and work process sharing – something that is difficult to manage in any lean manufacturing setup where new processes have to be taught. Visualizing these new processes through SMED – Single Minute Exchange of Die is one such process created that helps focus on TMP and transfer basic maintenance operations from staff to machine operators.

The world has been geared up for Industry 4.0 attaining the next level in terms of adoption and faster simulation. In the new normal, with the pandemic and lockdowns becoming a central point of consideration, there has been a higher record of acceptance after the success of early adopters. According to a McKinsey survey report, 94% respondents mentioned that Industry 4.0 helped them keep their operations running during the crisis. And 56% said these technologies had been critical to their crisis responses.

A consumer packaged goods company in Asia built a digital twin of its supply chain before COVID-19 and was able to run multiple scenarios during pandemic, preparing itself for multiple shutdowns of manufacturing locations or disruptions in raw-material supply. Also a PPE manufacturer in North America was able to commission increased capacity by installing a new manufacturing line through augmented reality based remote project execution.

Industry 4.0 and The New Normal

The COVID19 crisis has forced companies to rethink direction of their operational strategies, aligning business issues with use of Industry 4.0 technologies for better sustenance, in the new normal. With agility and flexibility gaining wide acceptance for increased productivity and minimized cost, technologies promoting remote working and collaboration are also

gaining steam as the new normal. Establishing robust supply networks with end-to-end supply chains that are no longer susceptible to dynamism but rather thrive on it, are being developed in full force.

There is a continuous volatility and disruption being seen in the post-COVID world where companies are being forced to think about resilience and flexibility along with cost and efficiency now. Different sectors are seeing different and deferred trends like aerospace will see prolonged period of suppressed demand, energy and materials players see huge fall in demand due to high costs, whereas consumer packaged products and medical products are racing to manage high and inconsistent demands.

The Way Forward

There needs to be focused approach in developing, adopting, and including Industry 4.0 technologies. Time and resources need to be deployed, strategically in a phase-wise approach to build this critical modus operandi as it is going to be the defining future of every business very soon. With a roadmap that comes with digital use cases, complete with target objectives, pursuing a rapid, agile process that rolls out, while following the broad framework, is going to be the way for businesses to get on this bandwagon.

Companies would wish to be ambitious but need to be pragmatic at the same time with lockdowns volatile supply chains, travel restrictions becoming a part of business. Companies would be able to progress faster with approaches that can be implemented remotely. Example of implementing data analytics technologies is easier to scale across multiple cities than anything. Businesses would also have to understand the trade-off's between being quick to implement, and being strategic to deploy for scale, to cordon off any expensive re-engineering that might come at a later stage. Having the right people, processes at the right time has always been a differentiating factor for a successful business. Getting that aligned with Industry 4.0 is going to be the game-changer for all businesses in the future.