

# Four ways to embrace and adopt **sustainable manufacturing practices**



Consumers are becoming increasingly eco-conscious and prefer environment-friendly enterprises. This is encouraging businesses to further embrace sustainable practices. In this article, **Mandar Mahajan** and **Amit Kumar Kaushal** underline four ways through which manufacturers can effectively infuse sustainability into their operations.

- When an Indian multinational launched a powder-to-liquid handwash – intended to replace the use of two bars of soap – it was a lighter product than soap. As a result, four times more handwash refills could be transported per truck which resulted in using less fuel for transportation and lowering the company's carbon emissions.
- An e-commerce giant, focussed on packaging, has been trying to optimise the size of its delivery boxes by using machine learning and data analytics. The company is also working on both onsite solar and offsite solar energy initiatives, with solar panels installed in many warehouses, wherever space permits.
- A consumer electronics maker has been testing its washing machines using air instead of water long before sustainability became a buzzword.

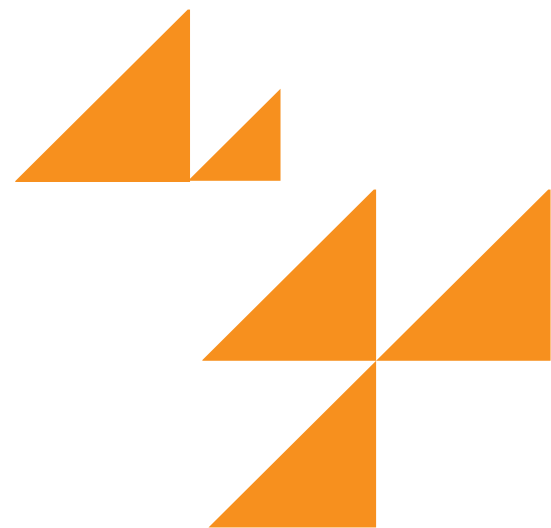
Conducting business sustainably does not merely mean designing and producing products that are sustainable. It needs to take into consideration the entire value chain and its impact on the environment and society at large. In recent times, pressure has mounted on manufacturers to adopt more sustainable practices and the call to action comes from the following stakeholders:

- consumers who seek sustainable products and are willing to pay a premium for it,
- investors who prefer companies that are mitigating their ecological footprint, and
- governments enforcing regulations to curb emissions.

This offers companies with new opportunities to rethink their business operations by incorporating environmental, social and governance (ESG) principles into their strategies. According to PwC's 25th Annual Global CEO survey, India CEOs perceive transition to net-zero commitment as a critical component for driving product and service innovation, and meeting customer expectations.<sup>14</sup> The following numbers underscore why companies need to put sustainability at the core of their operations:

- India's CO<sub>2</sub> emissions stood at 2.88 gigatonne (GT) in 2021.<sup>15</sup> India has set a target of bringing down its carbon emissions by 22% by 2030.<sup>16</sup>

- By 2030, India aims to reduce the carbon intensity of its economy to less than 45%.<sup>17</sup>
- The manufacturing sector, which contributed 14.4% to India's gross value added (GVA) in 2022<sup>18</sup> and accounts for about 15% of the country's gross domestic product (GDP) is also a major contributor of the country's emissions.
- Between 2005 and 2013, the greenhouse gas emissions of India's manufacturing companies almost doubled from 315 million metric tonnes (MMT) to 623 MMT.<sup>19</sup>



14 PwC's 25th Annual Global CEO survey

15 Centre for Science and Environment

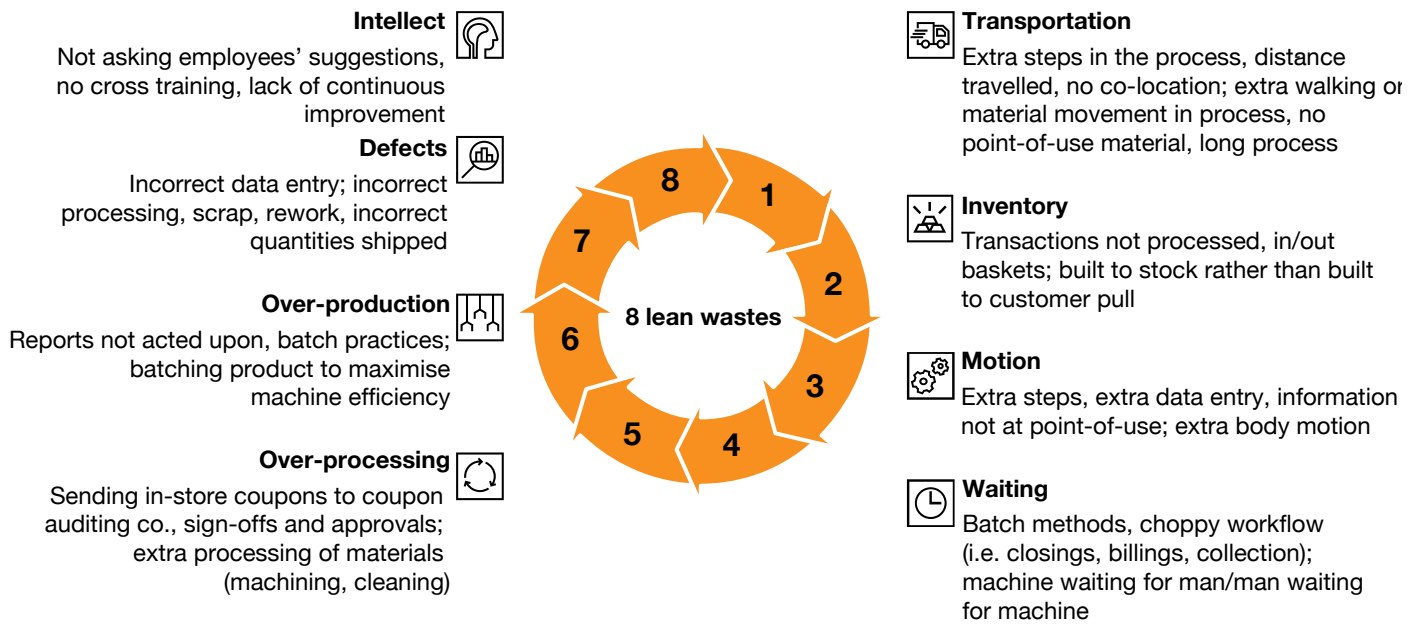
16 Ibid.

17 Ibid.

18 India's long-term low-carbon development strategy

19 Gupta, V., Biswas, T., & Ganesan, K. (2017). Industrial Emissions (Ver 2.0). Retrieved from GHG Platform - Council on Energy, Environment and Water.

**Figure 1: Eight lean wastes in manufacturing and non-manufacturing (service) environments**



To build sustainability into their operations, businesses may consider the following strategies:

**focus on asset care to optimise performance,**

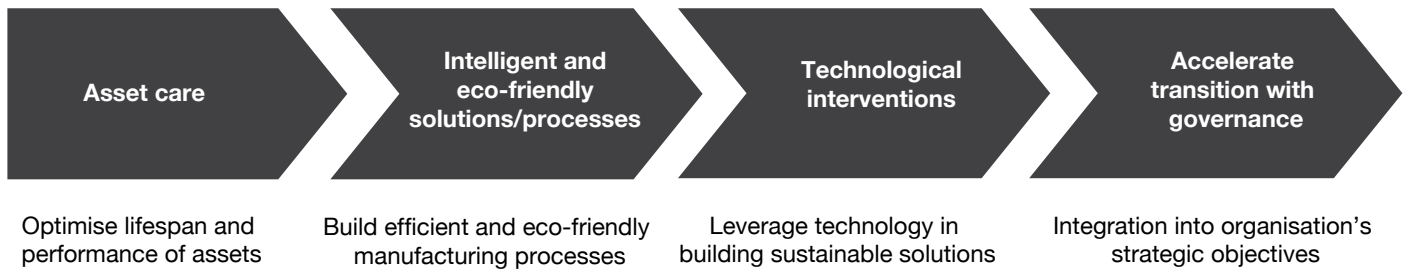
**build intelligent solutions and eco-friendly processes,**

**use technology-based interventions, and**

**accelerate transition with governance.**



**Figure 2: Key considerations to ensure sustainability in operations**



## Asset care

The first step in asset care is to optimise what the company has. Operations can become sustainable if companies can enhance the lifespan and performance of machinery, reduce downtime and minimise resource use. Major manufacturing companies are adopting the following sustainable practices:

- **Waste minimisation:** Implementing just-in-time (JIT) principles, lean inventory management techniques and minimising inventory waste while ensuring adequate asset availability.
- **Emissions reduction:** Streamlining transportation processes through route optimisation and shipment consolidation to bring down transportation waste and reduce fuel consumption and carbon emissions.
- **Energy investments:** Implementing predictive maintenance techniques and investing in energy-efficient technologies to lower energy consumption and emissions.

## How to achieve excellence in asset optimisation?

Industry players have achieved operational excellence by integrating people, process and asset care initiatives, realising throughput increase and overall equipment effectiveness (OEE) by more than 15% along with a reduction of in-process inventory, and energy and raw material costs. However, challenges related to asset maintenance are usually centered around the following questions:

- How to ensure peak performance of assets?
- How to undertake asset management at optimised cost?
- How to extend an asset's functional life?
- How to maximise efficiency of assets?

## Recommendation: Find the right mix of asset care, people and processes

Firstly, businesses need to ensure that their assets and asset systems remain aligned with operational strategies and performance levels

support annual business plan delivery. Active involvement of the leadership is critical to ensure the commitment and alignment of an organisation's sustainable goals with the overall business strategy. Asset maintenance requires proper work, shutdown and material management along with the identification of critical assets and condition monitoring. Business partner management, for instance, encouraging vendors to sustainably source raw materials, and proper hydrocarbon management – which ensures hydrocarbon materials are stored and handled safely – are also important for conducting effective sustainable operations. However, the key to achieving sustainability is through the successful implementation of operational excellence elements comprising:

- **Asset care:** Maximising the life of an asset by ensuring optimal utilisation and availability of an asset.
- **Process care:** Ensuring productivity and quality of output with a focus on building process capability, standardising work practices and adopting best practices in operations and maintenance.
- **People care:** Focusing on upgrading and enhancing the skill set as well as ensuring the availability and retention of skilled manpower.



Therefore, the right combination of asset management, processes, people and technology can lead to excellence in sustainable performance and deliver better outcomes in terms of:

- **Optimised asset performance:** Better availability and utilisation, longer mean time between failures (MTBF), longer mean time between service incidents (MTBSI), and improved product quality.
- **Lowered costs:** Waste elimination and continued improvements in processes, maintenance efficiency with regard to labour, material and contractors, maintenance effectiveness in terms of work and material quality.
- **Enhanced risk management:** Managing risks through identification of critical assets, developing life cycle plans, and asset health monitoring.

## Intelligent and eco-friendly solutions/processes

Leveraging technology to build intelligent and eco-friendly manufacturing processes can also help a business in achieving their sustainability goals. Optimising production processes through lean manufacturing methodologies, which aim to eliminate waste and boost productivity, can improve resource utilisation and lower energy consumption. Contract manufacturing organisations have

improved their productivity by adopting lean and the Six Sigma approach by 15–20%.<sup>20</sup>

## How to minimise waste and maximise value?

Businesses that are trying to streamline manufacturing processes encounter several challenges. For instance, identifying and minimising non-value-adding activities in production processes. Another common obstacle that manufacturers face is identifying sources of waste and eliminating them, addressing bottlenecks and defects, and reducing downtime to manage idle resources is also critical for continuous production flow, managing the transportation process which may lead to an increase in waste and increased costs, and aligning production with actual demand. Businesses walk a tightrope when it comes to inventory management. Excess inventory can tie up capital and take storage space while inadequate inventory can cause losses.

## Recommendation: Follow a process improvement approach

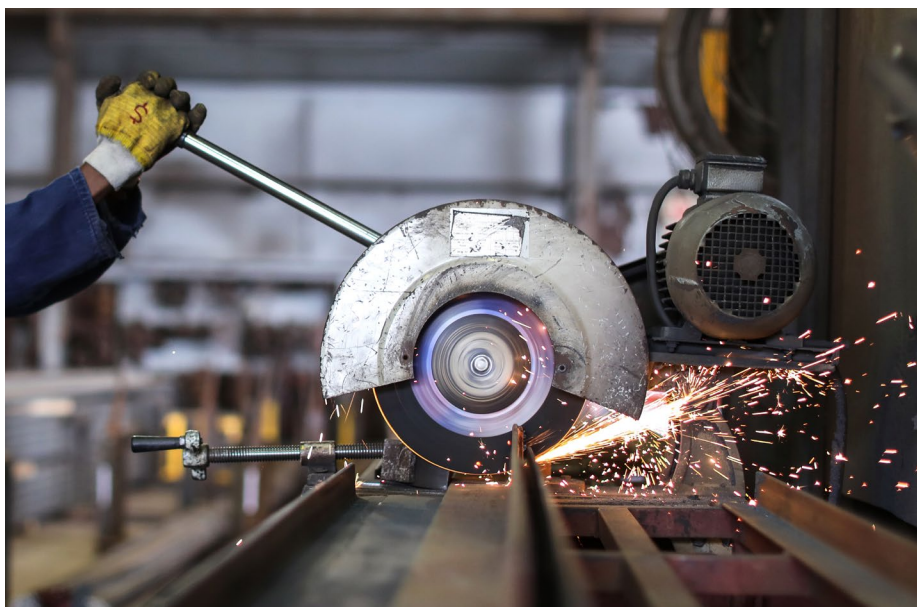
PwC India can help clients employ innovative approaches through process mapping and analysis to identify areas of inefficiency, waste, and environmental impact. A process improvement approach includes assessing the current processes, designing solutions

for improvement, implementing the solutions and maintaining the same. The following are the steps of a process improvement plan:

- **Assess:** This phase provides complete as-is mapping of processes, machines, capacity and manpower resulting in identification of bottlenecks, OEE levels and capacity.
- **Design:** In this phase, cross-functional teams are deployed for problem solving, solution design, prioritising areas of improvement and identifying quick win implementation areas.
- **Implementation:** The next step is implementing the new approach by setting up and empowering teams while tracking and monitoring KPIs.
- **Sustain and control:** New targets/KPIs are established to sustain the benefits and control mechanisms are designed and implemented to minimise risk.

A typical process improvement approach uses OEE and capacity evaluation to identify and drive areas of improvement. Value stream mapping also helps to identify wastes and bottlenecks and helps in eliminating or managing them systematically. The aim of this approach is to minimise non-value-added (NVA) activities, such as overproduction and overprocessing, in the desired state of processes. As a part of process improvement, process excellence is driven across the organisation, by mapping processes, identifying gaps, and improving turnaround times.

<sup>20</sup> Percentage based on PwC analysis



## Technological interventions

To drive sustainability, organisations must utilise advanced technologies by leveraging automation, robotics, and artificial intelligence to optimise processes, cut down errors, and boost efficiency. Companies can also enhance their ability to identify and prevent defect waste with smart quality control systems and predictive analytics. Adopting digital manufacturing technologies, such as the industrial Internet of Things (IIoT), gathering real-time data for data-driven decision-making, and optimising processes can help organisations in reducing waste generated through overprocessing.

Leading engineering and capital goods players have identified transformational opportunities across functions such as supply

chain and manufacturing and implemented improvement roadmaps comprising process, policy and digital interventions, resulting in 30% throughput improvement in critical chain tasks,<sup>21</sup> savings in manufacturing and raw material procurement, and effectively capturing the cost of poor quality (COPQ).

## How to align digital strategy with business objectives?

According to a 2023 PwC survey, Indian manufacturers are underprepared to start their digital transformation journey despite it being high on the agenda.<sup>22</sup> Most companies have seen moderate to low returns despite high investments due to lack of digital strategy and business strategy alignment.<sup>23</sup> The recent PwC survey revealed that:

- **38%** of the firms surveyed were yet to create a roadmap for digital transformation.
- **37%** of the firms surveyed believed that resilience and sustainability were driving digital transformation.
- **54%** of the firms surveyed showed an upward implementation trend towards adopting analytics and AI.<sup>24</sup>

## Recommendation: Foster digital knowledge through upskilling and change management initiatives

Indian companies are more likely to put people, policies and mindset first while global companies are more inclined to develop the right system for driving any transformation.<sup>25</sup> Successful digital transformation requires elements of centralised standard-setting. A typical digital transformation approach is focused on optimising the overall cost of operations via tactical and strategic interventions spread across three key themes. These include business process re-engineering (BPR), cost optimisation and digital interventions across functions/departments with due consideration and integration of:

- organisation strategy and governance ensuring the implementation of digital transformation.
- training/capability enhancement to ensure

21 Percentage based on PwC analysis

22 PwC survey. Reimagining digital factories of tomorrow

23 Ibid.

24 Ibid.

25 Ibid.

implementation and sustainability of digital transformation.

- change management for successful integration, implementation and sustenance of digital practices.

Thus, companies can undertake various initiatives such as organisational re-structuring, process efficiency improvement, enterprise resource planning (ERP) implementation, and vehicle management system to successfully adopt sustainable practices.

## Accelerate transition with governance

Robust governance practices ensure that sustainable operations are integrated with an organisation's strategic objectives. Establishment of clear policies, performance monitoring, and maintaining compliance with environmental regulations will meet market demand and reduce overproduction waste. Additionally, establishing clear metrics and KPIs, and implementing environmental management systems, such as ISO 14001 – an internationally agreed standard that sets out the requirements for an environmental management system – can help systematically manage environmental risks and drive continuous improvement.

## How to integrate sustainability with organisational goals?

Commitment from top leadership is essential to integrate environmentally responsible practices into a company's overall mission. While discussions on ESG are increasingly dominating the boardroom, directors still struggle to understand the connection between ESG and company goals.<sup>26</sup> PwC's Annual Corporate Directors Survey 2022 revealed that only 45% of the directors surveyed in the US believe that ESG issues have an impact on company performance. However, companies have been integrating ESG goals into their compensation plans for executives.<sup>27</sup> Today's workforce is also more eco-conscious and demands accountability from employers. For instance, PwC's Global Hopes and Fears Survey 2023 highlighted that 56% of the Indian respondents said that their employers have the responsibility to take action to address climate change.<sup>28</sup> Thus, employers need to incorporate ESG and include their employees in driving sustainable goals.

## Recommendation: Develop well-defined policies, performance metrics

A successful approach for incorporating sustainability into an organisation's objectives

requires establishing a three-step continuous improvement process which assesses the organisation's practices through a sustainability lens, identifies gaps, provides solutions and implements action plans. Given below are the details of the three steps of the process:

- **Review:** A process team monitors KPIs that measure the impact of sustainability initiatives and takes regular feedback from operational teams on areas which have optimisation potential (existing environmental management systems and risks) wherein a root-cause analysis is performed.

### Pre-requisites:

- Report and monitor KPIs
  - Operational team leads regularly collect and communicate feedback
  - Clear responsibility allocation
- **Solve:** Measures are suggested for each cause identified during the review stage. Meetings are arranged with multiple stakeholders to brainstorm and discuss the measures and change requests. It is important to have a training plan to align the changes with the organisational goals.
- **Pre-requisites:** A well-defined change request process.

26 PwC's 2022 Annual Corporate Directors Survey

27 Ibid.

28 PwC's Global Hopes and Fears Survey 2023

- **Execute:** The approved change (if needed) is executed. This may require change in IT requirements, trainings, communication or updating documents.
- **Pre-requisites:** Change implementation (IT/Non-IT)

## The way forward

India is slowly but steadily moving towards 'panchamrit' and its goal of net-zero carbon emission by 2070 to enable the green industrial and economic transition. The National Green Hydrogen Mission, with an outlay of INR 19,700 crore, will facilitate the transition<sup>29</sup> of the economy to low carbon intensity, reduce dependence on fossil fuel imports, and help the country assume technology and market leadership.<sup>30</sup>

Organisations can improve resource efficiency, reduce waste generation, and enhance environmental stewardship by focusing on long-term vision, adopting a holistic approach, working in collaboration with stakeholders, and aligning manufacturing processes with ESG principles. The Government of India is providing various green manufacturing incentives for conducting environmental audit, water conservation (25% grant to SMEs for expenditure incurred on audits subject to a maximum of INR 1 lakh), wastewater treatment and rainwater harvesting.<sup>31</sup> Lean manufacturing, process optimisation, and ESG goals can aid organisations in their journey towards building resilient and sustainable manufacturing operations that align with India's sustainable development goals.

Also contributing to this article were **Unmesh Lohite**, **Vishnupriya Sengupta** and **Ruchika Uniyal**



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29 PIB release on National Green Hydrogen Mission

30 Ibid.

31 PIB release