

GREEN LEAN DIGITAL

Developing the Sustainable Factory of the Future

Combination of ecological and economical
efficiency as a new strategic paradigm



Sustainability and economic success for future viability

We are living in an economic environment that requires growth and profitability to keep our social and wealth status – nobody wants to miss it and profitability is mandatory for successful companies.

At the same time we all observe the need push to contribute to defined climate change targets plus demand from our society addressing the responsibility of each of us.

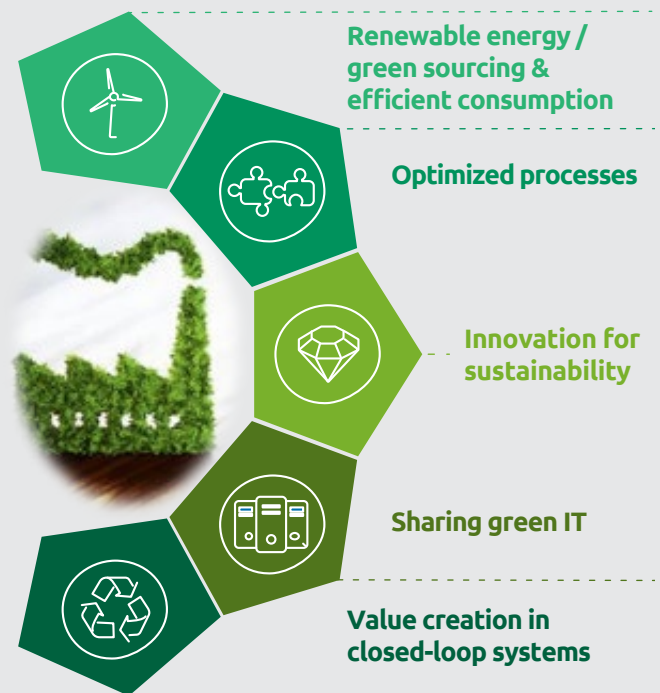
For future viability, a shift from sustainability as one of many factors to sustainability as an overarching guiding principle is required. And simultaneously sustainability must result in economic advantage.

Picture 1: Strategic building blocks and the changing role of sustainability



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Picture 2: The five levers for achieving sustainability in manufacturing




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To achieve efficient and sustainable operations in manufacturing, Capgemini has identified five main levers for improvement.

Sustainability is evolving from an outsider role to a new central strategic paradigm

¹ Internet : <http://www.oecd.org/innovation/green/toolkit/48704993.pdf>; 2019



“ Sustainability has to be a way of life to be a way of business.”²

Anand Mahindra
Chairman of Mahindra Group

The concept of sustainability focuses on satisfying the needs of the present without adversely affecting the conditions for future generations. It is based on three pillars: economic, environmental and social.³

Balancing business, environmental and human interests within manufacturing is our understanding of a green lean digital factory. By pursuing this idea, we increase sustainability within future factories.

² Internet: <https://economictimes.indiatimes.com/news/company/corporate-trends/how-mahindra-mahindra-is-championing-sustainability/articleshow/17499450.cms?from=mdr>, 2012 Gosh, L.; The Economist Times, How Mahindra & Mahindra is championing sustainability; 2012

³ Internet: <https://www.investopedia.com/terms/s/sustainability.asp>; <https://www.myclimate.org/information/faq/faq-detail/detail/News/what-is-sustainability/>; The ecological definition of sustainability originated with the Brundtland Report, 1987

Sustain

In order to sustain competitiveness in the manufacturing industry, it is still necessary to convince customers with price and quality of the products. But also, far-reaching factors such as the integration of employees, the ecological impact of production processes and the origin of the raw materials have an increasing impact on the future success of manufacturing companies.

Sustainability is emerging from a trend to a real business need, forced by market requirements and legal regulations. Often not in focus is the absolute positive effect on the cost reduction side when driving sustainability-related activities.

Customer view:

- Customers increasingly buy from companies with sustainable products and production

Legal view:

- Political legal regulations must be met by companies in a timely manner

Cost view:

- Not just the origin of resources and energy matters, but also the balancing of cost and efficient usage is key. Waste reduction in every area has a positive impact on the cost side.

Companies must elaborate answers to satisfy the expectations of customers, business partners and authorities to strengthen their market position in the long-term. They must transform sustainability from a marketing buzzword to a new central business paradigm.

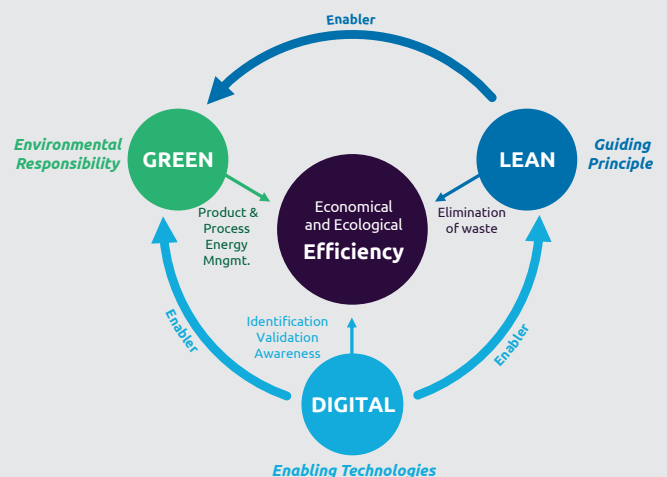
Now

Sustainability and corporate social responsibility (CSR) are not new topics, they are on the agenda of almost all companies. However, sustainability has not fully reached the shop floor while at the same time the pressure on organizations is increasing. In order to reach the sustainable production goals, we must consider digitalization as a key enabler. In summary, companies are confronted with maintaining high legal standards, social pressure, demanding customers and the impact of new technologies on their organization.

Future factories must keep pace to become GREEN LEAN DIGITAL

In the past, it may have been enough to claim small CSR initiatives as game changers. To fully meet the requirements of the future, an extensive transformation of the production is required. Such a transformation does not work overnight. It is a process which causes expenses that turn to savings over time – and it must start now to become a frontrunner instead of a late comer.

Picture 3: Green Lean Digital trio for ecological and economical efficiency in manufacturing



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Win

The objective is a win-win situation: the production organizations must be profitable, and the environment shall benefit. How? By realizing the GREEN LEAN DIGITAL factory to increase the economical and ecological efficiency.

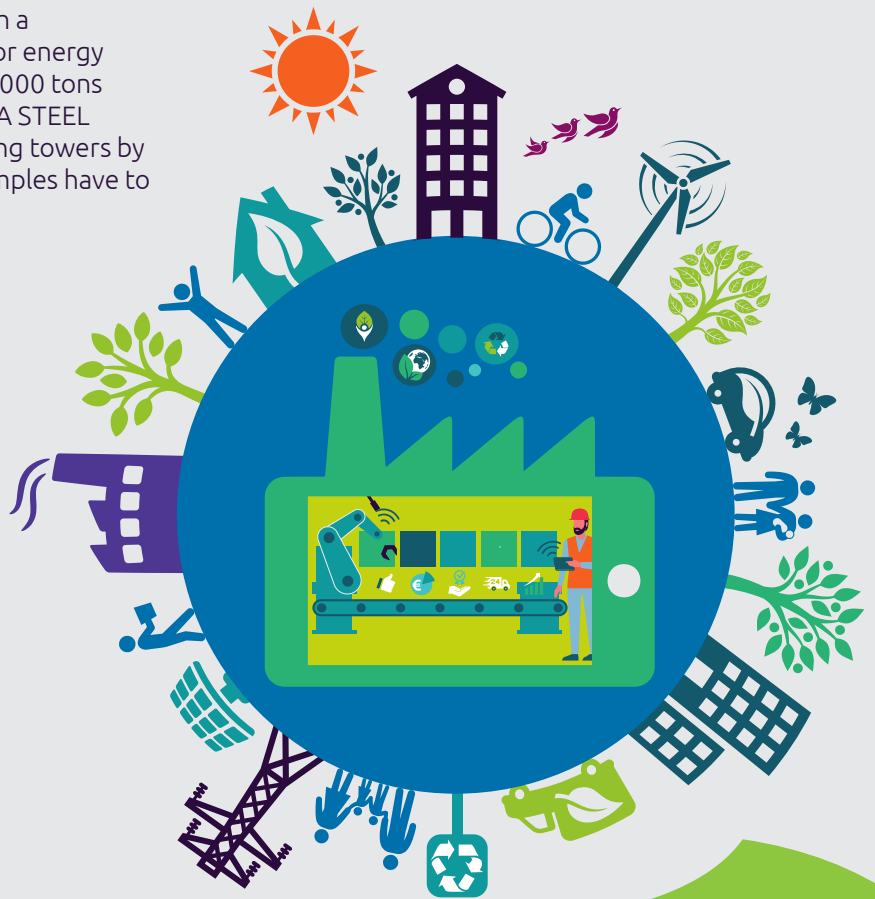
About half of the manufacturing costs are caused by (inefficient) consumption of raw materials and energy.⁴ Sustainability initiatives demonstrate that savings can be achieved and at the same time the environmental impact can be reduced.

Some companies have already proven such a positive effect. By using an IoT platform for energy consumption optimization, Bosch saves 5,000 tons of CO₂ and 2.4 million euros per year.⁵ TATA STEEL achieved an energy saving of 40% in cooling towers by using data analysis.⁶ Many more such examples have to follow in order to create our green future.



**Calculate not only in EURO,
but also in CO₂!**

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⁴ Internet: https://www.greenovate-europe.eu/sites/default/files/publications/REMake_Greenovate%21Europe%20-%20Guide%20to%20resource%20efficient%20manufacturing%20%282012%29.pdf; 2012

GREEN + LEAN + DIGITAL = Future

Sustainable Manufacturing

Sustainability is becoming one of the key aspects of the manufacturing industry. Considering the past developments in the manufacturing sector, profound changes have been recognized based on the lean philosophy as well as digital manufacturing. Will the fifth industrial revolution be green?

It will have a tremendous impact on the way factories of the future will be built, how production lines will be set up and how processes will operate. The vision of a green future must be anchored in the corporate vision and strategy since it is not only a topic for production. Nonetheless, it provides top-down guidance on how to integrate sustainability in the strategic direction of production. In addition, known actors like lean and digital approaches should not be neglected. On the contrary, both enable and support the idea of a sustainable factory. Green, lean and digital empower our factories for the future.

Factory of the future

LEAN Factory

The lean factory is the business philosophy to organize activities in the factory in a way that more benefits to the society and value to individuals can be delivered in the industry while eliminating waste⁷.

LEAN DIGITAL Factory

In addition to the lean factory philosophy, digital technologies enable efficient operations management of factory processes and organization.

GREEN LEAN DIGITAL Factory

All activities within the factory of the future will be balanced in respect to economical efficiency, environmental impact and technological scientific progress.



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“Sustainable manufacturing” – is no longer just nice-to-have, but a business imperative. Companies across the world face increased costs in materials, energy, and compliance coupled with higher expectations of customers, investors and local communities¹”

Andrew Wyckoff

Director, Directorate for Science, Technology and Industry, OECD

⁷ The definition of lean factory is derived from the definition of lean thinking by Daniel Jones, James P. Womack and Daniel Roos, who are the frontrunners of the lean philosophy. Their research was first published as the book “The Machine That Changed the World”, 1991

Current situation in many companies

When assessing the maturity for green, lean and digital manufacturing, companies often feel confident having understood lean principles and implemented them to the furthest extent. Regarding digitalization, companies have just started to implement concrete digital solutions and strive to realize the intended benefits. In addition, true sustainability gains importance as an overall paradigm and sets new targets which need to be balanced into the operating model of factories. Here we see the upcoming challenge where companies have not even started to reflect the potential future impact.

Start your journey!

How can manufacturing companies start the re-balancing of sustainability as a target dimension into their operating model?

First, manufacturers should gain an understanding of their actual starting point:

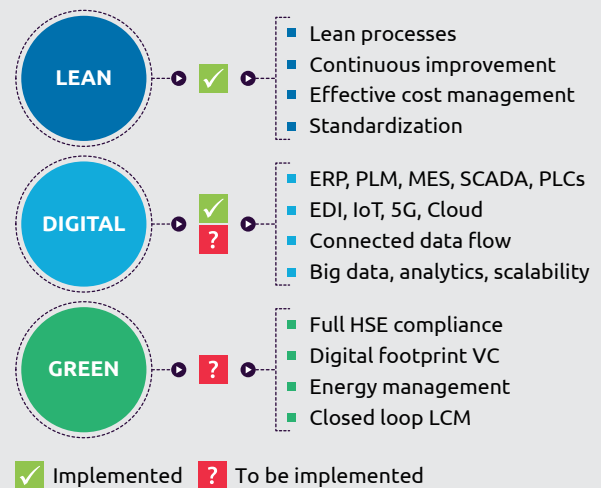
- Which assets are already available?
- How far is the organization developed towards sustainability and what is still lacking?
- Where are money and resources spent?
- What are the expected gains of becoming sustainable?

Define your starting point!

The first activities could be:

1. Perform a GREEN LEAN DIGITAL maturity analysis for a production site
2. Analyze the waste footprint of all your production steps at your site
3. Define your GREEN LEAN DIGITAL strategy (top-down)

Picture 4: Current implementation levels of Green Lean Digital components



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“Close cooperation with our clients to develop the best fit individual solution for a sustainable production is our collaborative working approach: What was jointly developed involving all relevant stakeholders will finally be implemented in the daily operation!”

Ralph Schneider-Maul

Head of Center of Excellence (CoE)
Digital Manufacturing



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