GOOD PRACTICE
COMPENDIUM
& STARTER KIT

earth
ethical & responsible transportation & handling

INNOVATION MANAGEMENT DIGITALISATION FOR SUSTAINABLE LOGISTICS

PRACTICE & EDUCATION GUIDE

2024

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THE *EARTH* PROJECT

The EARTH (Ethical and Responsible Transportation and Handling) project mission is to enhance the sustainability focus in logistics through integrating digital approaches to innovation management practices.

Good Practice Compendium & Starter Kit

The Good Practice Compendium & Starter Kit aims to foster a comprehensive understanding of how sustainability and innovation management can be effectively integrated into logistics operations.
It is designed to catalyse change within the logistics sector, promoting a shift towards more responsible and innovative practices that can lead to significant environmental, economic, and social benefits.

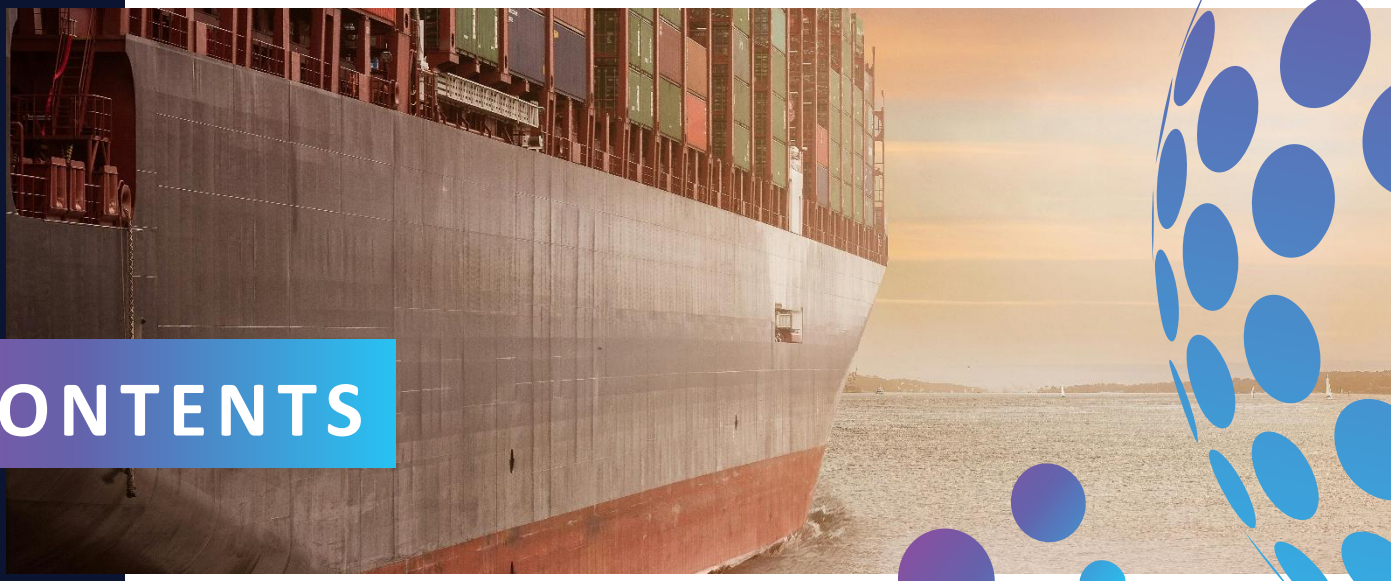
This Good Practice Compendium & Starter Kit aligns with the overall project objective, to provide the teachers with inspirations to integrate the SDGs & innovation management principles into their curricula. It aims to build teachers' awareness, knowledge, & motivation to incorporate the SDGs & innovation management skills into their courses, creating the conditions for them to continue participating in the project & using further resources.

Practice & Education Guide

The Guide is crafted to provide an in-depth exploration and guidance on integrating the SDGs into innovation management digital practices, emphasising particularly the needs of the logistics sector. Aimed at innovation managers, educational institutions, and policymakers, this guide encapsulates a range of strategies on digitalising innovation management practices to serve more sustainable future.

The Guide aims to enhance an understanding of:

- the sustainability focus in business, particularly in logistics
- the relationship between sustainable solutions and innovation management in logistics
- the role of digital solutions for innovation management relevant to logistics and driving sustainability



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01

INTRODUCTION

INTRODUCTION

Welcome to the Practice & Education Guide

In an era where innovation management and digitalisation are key drivers of success, the logistics sector is undergoing a profound transformation. The Practice & Education Guide is designed to help logistics professionals, businesses, and policymakers navigate the integration of digital solutions and innovative strategies into logistics practices. This guide aims to inspire and support the teaching of innovation management and digitalisation within logistics, offering insights and strategies to help educators equip students with the knowledge and tools needed to drive sustainable change in the sector.

The Urgency for Sustainable Logistics

The logistics industry is crucial to the global economy, driving trade and commerce across borders. However, it also contributes significantly to environmental, economic, and social challenges, including carbon emissions, resource depletion, and inequalities within the workforce. As the effects of climate change, economic instability, and social disparities become more pronounced, there is an urgent need to embrace sustainable practices that not only minimise environmental impact but also foster economic growth and improve social well-being, ensuring a more resilient and equitable logistics sector for the future.

Objectives of the Guide

- **Demystify Innovation Management:** Clarify the concept of innovation management in logistics, explaining why it is critical for businesses to adopt digital solutions and innovation processes to improve efficiency and stay competitive.
- **Offer Practical Guidance:** Provide educators with the knowledge and tools to effectively teach innovation management and digital solutions in logistics, including strategies for addressing common challenges and leveraging new opportunities to enhance learning outcomes and foster a deeper understanding of sustainable practices in the sector.

Navigating the Guide

The Practice & Education Guide is organised to provide a clear path from understanding the core principles of sustainability in logistics to applying these concepts in both educational and practical contexts:

- ❑ **Section 02: Sustainability and Business** explores how businesses can align with sustainability goals and integrate sustainable practices into their operations.
- ❑ **Section 03: Sustainability and Innovation in Logistics** focuses on how innovation can drive sustainability within the logistics sector, including practical examples of successful implementation.
- ❑ **Section 04: Digitally-facilitated Innovation Management for Sustainable Logistics** examines how digital tools and technologies can support innovation and sustainability in logistics operations.
- ❑ **Section 05: Teaching Innovation in Logistics** offers strategies and approaches for educators to teach innovation management effectively, focusing on fostering the skills needed to drive sustainable change in logistics.

In Essence…

The journey towards sustainable logistics is complex but essential. Through this Practice & Education Guide, we aim to inspire and empower stakeholders in the logistics sector to take decisive steps towards sustainability and digital innovation management, ensuring a healthier planet and a more equitable society. Together, we can transform challenges into opportunities for growth and innovation.

LEVERAGING INNOVATION MANAGEMENT DIGITALISATION FOR MORE SUSTAINABLE LOGISTICS

02

SUSTAINABILITY AND BUSINESS

SUSTAINABILITY AND BUSINESS

Agenda for Sustainable Development – 2030 and responsible business

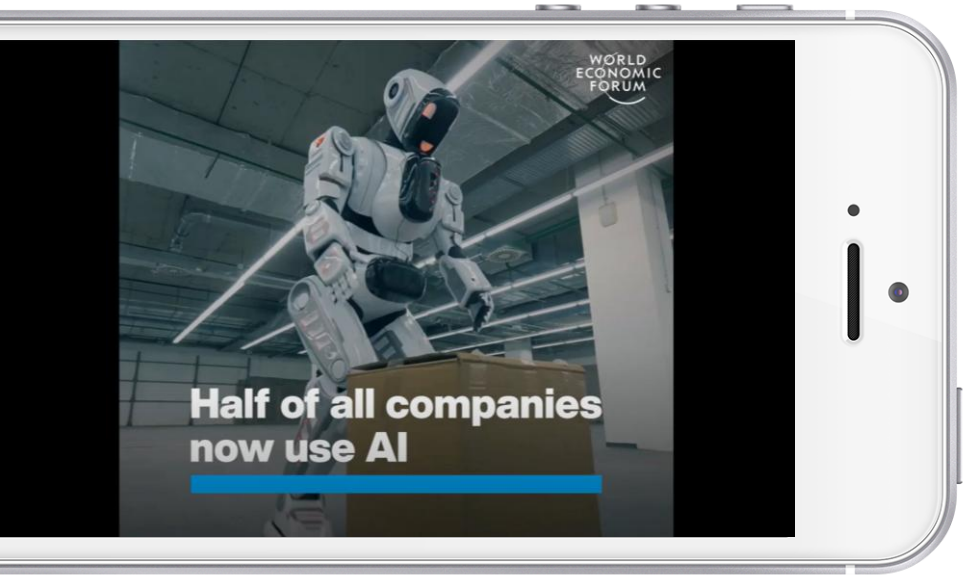
In the face of widespread and growing challenges to civilisation, including finite resources, climate change, demographic issues, and the difficulties confronting the global economies as a result, **the concept of sustainable development** appears to offer a solution and a means of mitigating or addressing these adverse phenomena.

Sustainable development, as originally defined in the 1987 Brundtland Report of the World Commission on Environment and Development, *Our Common Future*, refers to **"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"** (EUR-Lex).

In response to these pressing issues, UN member states, through the document *Transforming Our World: The 2030 Agenda for Sustainable Development*, signed in 2015, have committed to a plan aimed at driving change in five critical areas for society: people, planet, prosperity, peace, and partnership. The document outlines **17 Sustainable Development Goals (SDGs)** alongside 169 specific actions to be implemented by national governments, international organisations, NGOs, the scientific community, businesses, and individual citizens.

The Agenda for Sustainable Development highlights the **potential for businesses to contribute** meaningfully to the achievement of these goals **through intentional and deliberate actions**.

Enterprises can play a role by integrating socially responsible activities into their operations, pursuing more informed investment strategies, forming partnerships, adopting sustainable business models, and taking inclusive approaches to market expansion. Additionally, companies can implement sustainable resource management policies within their organisations.



WATCH:
"The future of business is digital and sustainable"

SDGs BUSINESS ALIGNMENT

The below presented contextualisation of the 17 Sustainable Development Goals offers practical examples of actions businesses can undertake to align their commercial objectives with these global targets.

GOAL 1: No Poverty - Ensure enhanced mobilization of resources and their better use with contribution to end poverty in any form and place (e.g. ensure better products availability, access to services);
GOAL 2: Zero Hunger - Increase investment, including through enhanced international cooperation, in rural infrastructure, in order to enhance agricultural productive capacity and better food distribution
GOAL 3: Good Health and Well-being - Ensure healthy lives by assuring access to safe, effective, quality and affordable essential medicines and vaccines for all;
GOAL 4: Quality Education - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; build and upgrade education facilities that are child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all;
GOAL 5: Gender Equality - Ensure women's full and effective participation and equal opportunities for leadership; enhance the use of enabling technology, in particular ICT, to promote the empowerment of women;
GOAL 6: Clean Water and Sanitation - Ensure sustainable water management; expand international cooperation and capacity-building support to developing countries in water-related activities;
GOAL 7: Affordable and Clean Energy - Increase the share of renewable energy in the energy mix; expand infrastructure and upgrade technology for supplying modern and sustainable energy services;
GOAL 8: Decent Work and Economic Growth - Ensure sustained, inclusive, sustainable and productive employment; achieve higher levels of productivity through diversification, technological upgrading and innovation; improve resource efficiency in consumption and production;
GOAL 9: Industry, Innovation and Infrastructure - Build resilient and environmentally sustainable infrastructure to support economic development and human well-being;
GOAL 10: Reduced Inequality - Empower and promote the social, economic and political inclusion of all; ensure sustainable income growth;
GOAL 11: Sustainable Cities and Communities - Ensure access for all to adequate, safe and affordable housing and basic services; provide access to safe, affordable, accessible and sustainable transport systems; reduce the adverse environmental impact of cities;
GOAL 12: Responsible Consumption and Production - Ensure sustainable consumption and production patterns, particularly efficient use of natural resources; reduce food losses along production and supply chains; achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, and significantly reduce their release to air, water and soil; reduce waste generation through prevention, reduction, recycling and reuse; integrate sustainability information into companies reporting cycle;
GOAL 13: Climate Action – Contribute to raising capacity for effective climate change-related planning and management; Improve education on climate change impact reduction;
GOAL 14: Life Below Water - Prevent and significantly reduce marine pollution; take actions for oceans restoration in order to achieve healthy and productive oceans;
GOAL 15: Life on Land - Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands;
GOAL 16: Peace and Justice Strong Institutions - Ensure responsive, inclusive, participatory and representative decision-making; promote non-discriminatory policies for sustainable development;
GOAL 17: Partnerships to achieve the Goal – Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries; enhance the global partnership for sustainable development that mobilize and share knowledge, expertise, technology and financial resources.

ALIGNING SUSTAINABLE GOALS WITH BUSINESS PERFORMANCE

The Sustainable Development Goals (SDGs), along with the established development priorities, align with the three dimensions of sustainable development: economic, social, and environmental (Grynia, 2023, p.78).

The adoption of the Sustainable Development Goals by the United Nations in 2015 marked a pivotal moment for global efforts towards sustainability. **These goals provide a blueprint for addressing critical challenges such as poverty, inequality, climate change, environmental degradation, peace, and justice**. For businesses, the SDGs offer not only a framework for enhancing their corporate social responsibility but also a strategic foundation for **driving innovation and competitive advantage**.

Businesses can contribute to the Sustainable Development Goals in ways that not only avoid conflicting with their economic interests but actively enhance them. For instance, companies can achieve this by:

- ❑ **Placing greater emphasis on resource efficiency**, including the use of natural resources (Goals 1, 6, 12, 14, 15).
- ❑ **Broadening their market reach** by engaging with developing countries (Goals 2, 10, 17),
- ❑ **introducing so-called frugal innovations designed** to serve less affluent populations while maintaining profitability (Goals 2, 11, 17).
- ❑ **Pioneering disruptive innovations**, which leverage emerging technologies to provide solutions for groups of customers previously excluded from accessing certain product categories (Goals 2, 3, 10, 11, 16, 17).
- ❑ **Creating opportunities for education and development for their employees** (Goals 4, 13),
- ❑ Adopting equal opportunity policies to **maximise the utilisation of all existing and potential resources** (Goals 5, 8, 10),
- ❑ **Making thoughtful investments in infrastructure** that benefits the environment and future generations (Goals 7, 8, 9).

Some benefits from integrating SDGs in business

1. **Risk Management:** Integrating SDGs helps businesses identify and manage risks associated with environmental, social, and governance factors. For logistics operations, this could mean mitigating risks related to regulatory changes, environmental impacts of operations, or disruptions in global supply chains.
2. **Enhanced Brand Image and Market Position:** Companies that are perceived as sustainable are often more attractive to investors, partners, and customers. Adopting SDGs can enhance a company's reputation, leading to improved market position and customer loyalty.
3. **Operational Efficiencies:** Many SDGs encourage practices that can lead to more efficient operations. For example, SDG 12 promotes sustainable consumption and production patterns, which can help logistics companies reduce waste and lower operational costs.
4. **Innovation and Access to New Markets:** Aligning with SDGs can spur innovation within companies. New sustainable practices or technologies can open up access to new markets or sectors that value sustainability, providing growth opportunities.
5. **Attracting Talent:** A commitment to sustainability can make a company more attractive to top talent. Many professionals seek employers with strong sustainability credentials and values aligned with their own.

03

SUSTAINABILITY AND INNOVATION IN LOGISTICS

The Role of SDGs in Transforming the Logistics Sector

> **“SDGs: TRANSFORMING LOGISTICS FOR A SUSTAINABLE TOMORROW”**

The logistics industry, a critical component of global trade and commerce, faces unique challenges and opportunities as it strives to integrate Sustainable Development Goals. These goals offer a strategic pathway to sustainability and a competitive advantage in a rapidly evolving market.

By strategically embracing these goals, logistics companies can not only revolutionise their operational practices but also significantly reduce their environmental footprints and enhance societal contributions. This comprehensive approach underscores the potential for SDGs to drive profound change and sustainable development within logistics operations, fostering a more resilient and responsible future.

SDGs in LOGISTICS

In logistics, the SDGs drive innovations in processes such as supply chain management, warehousing, material handling, sourcing, waste management, resource management, packaging, and distribution (Jubrail 2024; Shamout, 2024; Malinowska, 2022; Bartolini et al., 2019; Malinowska, 2019; Yakovleva, 2019; Fichtinger, 2015; Wichaisri, Sooksiri, and Sopadang, 2014; Amjed, 2013; El-Berishy, 2013; Day et al., 2011).
The Table provides **examples of actions taken by logistics companies to meet sustainability goals** in six areas: CO2 emission reduction, energy efficiency, waste reduction, awareness-raising, modern technology and IT implementation, and increased equality and accessibility (Bisogni at al., 2024)

Dimension of sustainability implementation	Examples of projects towards sustainability in logistic and transport	Supported sustainable development goals
Reduction of CO2 emission	Route optimization, low and zero emission vehicles utilization, alternative fuels application (biofuels, hydrogen, etc.), integration of multimodal transport, application of IoT devices, application of telematics and GPS systems	**Goal 7:** Affordable and Clean Energy **Goal 9:** Industry, Innovation, and Infrastructure **Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 13:** Climate Action
Energy efficiency	Implementing intelligent and energy efficient lighting and HVAC systems (heating, ventilation, air conditioning), implementing renewable energy sources, implementing mechanism reducing the water flow, utilization of alternative water sources, application of automated and robotic storing and transportation systems, application of IoT devices, implementing EMS (energy management system)	**Goal 6:** Clean Water and Sanitation **Goal 7:** Affordable and Clean Energy **Goal 9:** Industry, Innovation, and Infrastructure **Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 13:** Climate Action
Reduction of waste	Recycling of packages and waste, reverse logistic development, application of reusable packaging materials, utilization of ecological friendly, biodegradable and recycled material for packaging purposes, optimization of package size	**Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 13:** Climate Action **Goal 14:** Life Below Water **Goal 15:** Life on Land
Raising awareness	Eco driving trainings, MHE (material Handling Equipment) trainings, recycling and sustainable development trainings, creating plans and politics for the purpose of risk management and business continuity in relation to climate changes and disruptions, searching sustainability-oriented partners, cooperating with business partners to implement sustainable practices and share experiences, trainings supporting the equality and accessibility, creating and compliance with the principles of professional ethics	**Goal 4:** Quality Education **Goal 8:** Decent Work and Economic Growth **Goal 9:** Industry, Innovation, and Infrastructure **Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 13:** Climate Action **Goal 16:** Peace, Justice, and Strong Institutions **Goal 17:** Partnerships for the Goals
Implementing modern technologies and IT solutions	Implementing energy management systems to optimize energy consumption and monitoring, implementing TMS systems to optimize transportation processes, implementing dedicated IT system to optimize logistics and transportation processes and improve the supply chain functioning: SCM, ERP, WMS, WCS, YMS, TMS, etc., application of business intelligence systems and AI systems, application of IoT devices, application of telematics and GPS systems	**Goal 7:** Affordable and Clean Energy **Goal 9:** Industry, Innovation, and Infrastructure **Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 13:** Climate Action
Increasing equality and accessibility	Providing accessibility to goods and services (also in countries with low development level, during war and crisis, with hunger and diseases), investing in logistic and transportation infrastructure to reduce the difference in countries, regions and cities, developing logistic network (also in hard to reach locations), creating and developing new job opportunities, overcoming barriers in the field of employment of people from different countries, cultures, regardless different languages, sex, etc., implementing accessibility solutions, creating a friendly work environment	**Goal 1:** No Poverty, **Goal 2:** Zero Hunger **Goal 3:** Good Health and Well-being **Goal 5:** Gender Equality **Goal 8:** Decent Work and Economic Growth **Goal 9:** Industry, Innovation, and Infrastructure **Goal 10:** Reduced Inequalities **Goal 11:** Sustainable Cities and Communities **Goal 12:** Responsible Consumption and Production **Goal 17:** Partnerships for the Goals

INNOVATION AND SUSTAINABLE INNOVATION IN LOGISTICS

As the output of logistics, both as a corporate function and as a service sector, is not a product, the innovation in L&SCM, refers mainly to a **new way of doing things** (process and organizational innovation), and sometimes to **new service development**.

The objective of sustainable innovations in logistics is to achieve high standards across environmental, social, and economic dimensions. This entails preventing environmental degradation caused by human activities in logistics processes, using resources efficiently and responsibly to generate profit without causing harm to the environment or society, employing ethical practices in logistics and supply chains, from sourcing raw materials to distributing final products, while ensuring the protection of employees and stakeholders.

The implementation of sustainable solutions depends on factors such as policies and regulations, regional adaptation requirements, innovation costs, strategies, and management approaches. Technological advancements and expertise are also critical, given the rapid pace of progress and the complexity of emerging technologies. Companies operating within complex supply chains must integrate various technologies and establish shared sustainability goals with their partners, which requires openness and social awareness.

READ: Effects of Digital Innovation on Sustainable Operations of Logistics

SUSTAINABLE INNOVATIONS IN LOGISTICS

The literature analysis provides some insights into the areas of interest of logistic sector around innovation & sustainability. These can be summarised into 14 clusters, that are detailed below.

#0 Strategic Planning - represents the work related to strategic planning in the field of logistics and sustainability. As strategic planning is critical to the creation of sustainable logistics systems, this cluster focuses on resource planning, long-term sustainability goals and optimising logistics processes.

#1 Non-profitable Subfield - refers to areas of sustainability or logistics that do not generate profit or where compelling environmental or social benefits are at the forefront.

#2 Reverse Logistics - focuses on reverse logistics, which includes recycling and reuse from a sustainability perspective. Reverse logistics includes recycling and waste management processes.

#3 Electric Vehicle - This cluster in green focuses on electric vehicles. Electric vehicles are an important tool to reduce carbon emissions and provide sustainable transport. This cluster probably includes the use of electric vehicles in logistics processes and their impact on sustainability.

#4 Learning Algorithm - represent artificial intelligence and machine learning algorithms used in logistics processes. Learning algorithms can help make logistics processes more efficient and sustainable.

#5 City's Progression - studies on urbanisation and sustainable development of cities. Sustainability policies of cities can influence logistics processes and the development of transport infrastructure.

#6 Energy Efficiency Investment - covers investments to improve energy efficiency. Energy efficiency investments have an important place in sustainable logistics and operations.

#7 Shrubland Fuel - related to biofuels or fuel types derived from shrubland plants. The use of biofuels among sustainable energy sources is gaining importance, especially in transport and logistics.

#8 Environmental Kuznets Curve - refers to research based on the theory that examines the relationship between economic growth and environmental impacts.

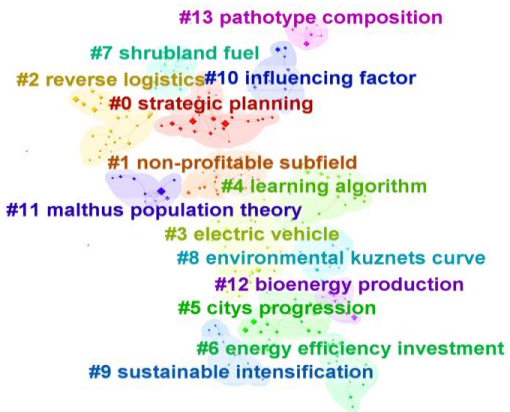
#9 Sustainable Intensification - This cluster in dark blue focuses on the concept of sustainable intensification in agriculture and food systems. This refers to the effort to minimise environmental impacts while increasing productivity.

#10 Influencing Factor - covers the study of influencing factors on logistics and sustainability. For example, factors such as costs, environmental regulations and customer expectations can be analysed in this category.

#11 Malthusian Population Theory - include studies that examine the impact of population growth on sustainability. Malthusian theory is based on the idea that resources are finite and that continuous population growth will make sustainability difficult.

#12 Bioenergy Production - relate to bioenergy production as a sustainable energy source. Bioenergy is seen as an important area to replace fossil fuels and reduce the carbon footprint.

#13 Pathotype Composition - focus on a specific topic such as pathotype composition used in biological or environmental research. This is seen as a sub-field in sustainability studies examining biodiversity and environmental impacts.



SUSTAINABLE INNOVATIONS IN LOGISTICS

Logistic businesses case studies analysis provides some aditional insights into aproaches to sustainable innovation in the sector.

Leadership-Driven Innovation and Automation

Innovations in logistics, especially those requiring substantial capital investment (e.g., automation and digitalisation), are predominantly driven by top executives or entrepreneurs rather than lower-level managers or employees.
Automation projects, such as those implemented by Italtrans and Fiege, demonstrate that technological innovation can serve as a catalyst for social sustainability. For example:

Automating heavy-lifting tasks reduces physical strain on employees, fostering better working conditions.

Higher levels of automation reduce reliance on temporary workers, enabling companies to offer more stable, long-term employment contracts.

Automation also improves operational efficiency by optimising warehouse management, accommodating peak demand, and addressing supply shortages.

Limited Role of Customer Expectations in Sustainability Initiatives

Although logistics service providers (LSPs) acknowledge the importance of customer expectations as a driver for sustainability, these expectations are rarely substantiated in practical terms.
Customers infrequently include sustainability criteria in tenders, and their contributions to sustainability initiatives tend to be limited or inconsistent. For example:

While some customers initiate and invest in projects like electric trucks, others reject sustainability efforts (e.g., substituting plastic fillers with paper) due to cost concerns.

Collaborative practices in logistics (e.g., backhauling and Vendor Managed Inventory) primarily focus on economic sustainability, such as reducing transport costs and maximising efficiency, rather than explicitly addressing environmental or social sustainability.

Missed Opportunities for Collaboration on Sustainability

Despite academic consensus that achieving sustainability requires collaboration among supply chain members, the empirical evidence suggests that collaboration on social and environmental sustainability remains underdeveloped.
Successful economic sustainability practices like backhauling and VMI demonstrate the potential for applying the same engineering, data-sharing, and standardisation skills to sustainability projects, but this potential is not realised.

Lack of Structured Customer-Provider Dialogue on Sustainability

Interactions between LSPs and their customers regarding sustainability are informal and sporadic. Inputs are often collected through ad hoc conversations during business visits, conferences, or trade exhibitions.
Structured tools like joint strategic planning meetings, customer retreats, or customer panels—which could foster deeper engagement and collaborative planning for sustainability—are notably absent.

Disconnect Between Research and Practice

The findings highlight a significant gap between academic theories on sustainability-driven supply chain collaboration and the realities observed in practice.
While many academic studies emphasise the importance of collaborative efforts in achieving sustainability, the text shows that practical implementation of such efforts is limited, especially for social and environmental goals.

04

DIGITALLY-FACILITATED INNOVATION MANAGEMENT FOR SUSTAINABLE LOGISTICS

INNOVATION MANAGEMENT

Innovation in business is not just the new idea, but the idea that has been commercially implemented. This perspective on innovation implies that the innovation process generally involves generating and developing ideas and transforming these ideas into innovations. Viewing the innovation process as the active and purposeful organization, control, and execution of activities leading to innovation, highlights the importance of intentional **innovation management**, having consequence in expected outcomes (Bisogni, Lobacz, Malinowska 2024).

This calls for a need to define activities to be considered as part of the proces. One of the generic aproaches relevant for the service sector has been outlined below (Helmer et al., 2021).

Innovation process stage	Description
Innovation opportunity identification	Opportunity Identification is usually the first step in innovation process. It includes gathering innovation insights and identifying areas of opportunities from these insights. Specific activities, for instance, would involve conducting market research and customer interviews, study new trends and technology, and observing customer and target groups. All those activities contribute to understanding and scoping a problem based on the needs of customers and/or users.
Ideation and idea management	The second step that is a vital element of innovation process is Ideation and Idea Management. The ideation phase not only involves the creation of ideas, but the entire decision-making process related to ideas selection and organisation. Therefore, the second process step entails, in detail, idea generation, idea scoping, idea assessment, and idea prioritizing and selection. These steps comprise concrete activities from brainstorming, sketching out blueprints over risk evaluation to ranking the ideas. The focus is not only on idea generation but puts equal emphasis on selecting the right idea that is based on the problem identified.
Concept development	Ideation is usually followed by Concept Development which includes concept generation, concept description, concept selection and concept testing. This process phase focuses on, among other activities, very detailed and advanced ideation with concept-building related activities, describing practical use cases, and creating first prototypes and first drafts of the idea that are tested internally and with customers. During this phase, the idea is enhanced with more details and brought to life.
Service/Product/Process development	Development phase enhances commercial value of innovation ideas and entails their further development. Explicitly it includes implementation of changes after having tested the concept, experimentation and/or simulation of the implemented ideas, as well as the preparation for validation of the early innovation versions. In this process stage, implementation and integration activities such as software development would be a focus, design activities, many rounds of prototyping and developing innovation ready for pilot testing.
Testing and validating	Testing and Validating step is important whenever usability of innovation plays a role. This may include the instalment and deployment of developed new solutions, setting up the pilot product or service and testing and validating with final users. More specifically, that may be setting up a way to showcase the product, service or process, setting up a pilot store and doing many different customer tests such as field tests, beta tests or in-home use tests. All of these tests will be focused on acquiring direct feedback from first-time users or customers or gaining insights into their behaviour.
Launch/commercialisation	Launch of the innovation is the last step on the way to innovate, thus it focus mainly on new solution commercialization. Commercialization would entail concrete activities such as implementing a market launch plan, generating first sales, and continuous verification of the solution and commercial outputs resulting from its implementation. In terms of process innovation, it includes the implementation of new technologies and procedures and exercising control over the process feasibility and efficiency.

DIGITALISATION OF INNOVATION MANAGEMENT

Digitalisation is reshaping the way businesses understand innovation and manage innovation

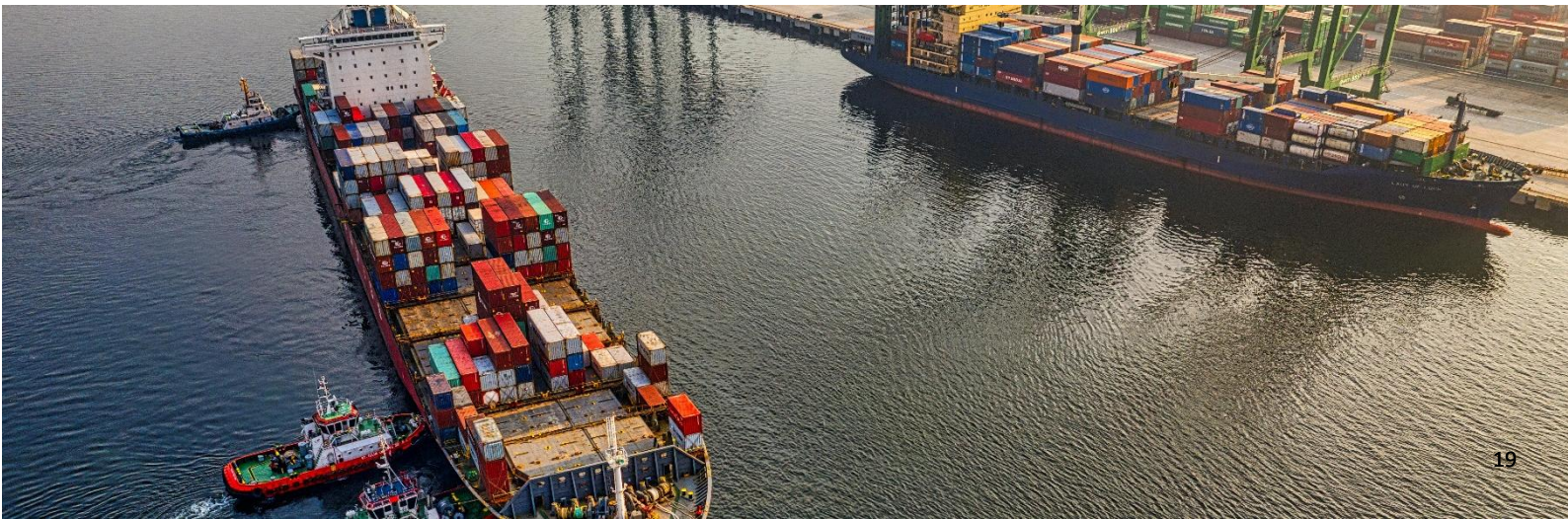
With the growing availability of digital tools and platforms, business models and market offerings are evolving, and the methods companies use to develop and introduce innovations are undergoing significant change.
Innovation is becoming inherently complex, involving numerous individual and organisational participants, as well as a variety of activities that can be prioritised and structured in diverse ways.

Digital tools play a critical role in this transformation, offering capabilities such as **organising information**, **defining evaluation criteria**, **improving collaboration with partners**, **enhancing customer engagement** for idea generation and feedback, and **enabling seamless knowledge-sharing** and **coordination within organisations**. These tools also facilitate activities such as **designing**, **prototyping**, and **testing** new products and services.

IT systems for innovation management offer a range of functionalities that significantly enhance the innovation process. These include:

- **Information Organisation and Categorisation:** IT systems help in structuring and categorising large volumes of data, making it easier to access and utilise for innovation-related activities.
- **Defining Evaluation and Valorisation Criteria:** These systems enable businesses to set criteria for assessing and prioritising ideas, projects, and potential innovations.
- **Improved Collaboration:** IT tools facilitate seamless interaction with business partners and stakeholders, allowing for better idea exchange, co-creation, and joint problem-solving.
- **Customer Engagement:** Businesses can use IT platforms to gather customer insights, collect ideas, and share experiences, improving the alignment of innovations with customer needs.
- **Internal Coordination and Knowledge Sharing:** IT systems enhance team collaboration, support knowledge sharing across the organisation, and streamline activities like brainstorming, reporting, and project tracking.
- **Prototyping and Testing:** These systems support the design, prototyping, and testing of new products, services, or processes, making development cycles faster and more efficient.
- **Data Analysis and Decision Support:** IT systems enable the analysis of large datasets to identify trends, assess performance, and support data-driven decision-making in innovation management.

By incorporating these functionalities, IT systems play a critical role in modernising and optimising innovation processes.



DIGITALISATION OF INNOVATION MANAGEMENT

Specific benefits from digitalising innovation management in business organisations

- **Efficiency and Cost Reduction:** Digitising the innovation process offers substantial cost savings and boosts efficiency. By automating information-intensive tasks and streamlining workflows, organisations can reduce administrative costs, enhance process speed, and improve overall resource utilisation. These improvements lead to quicker innovation cycles and more effective decision-making, resulting in better outcomes with fewer resources.
- **Broader Collaboration and Inclusivity:** Digital tools play a pivotal role in fostering collaboration, enabling companies to involve a broader group of stakeholders, including employees, customers, and external partners, throughout the innovation process. Real-time collaboration platforms allow for seamless communication, immediate feedback, and idea exchange, making innovation more participatory and customer-focused. This inclusive approach enhances creativity and results in solutions that better meet market needs.
- **Support Across Innovation Phases:** Digital tools support each stage of the innovation process, from initial idea generation to the final product launch. During the identification phase, market scanning tools gather and analyse customer needs and trends, while idea management platforms enable the collection and evaluation of ideas. Collaboration tools help manage teams and ideas during the concept development and testing stages, while digital prototypes and simulations facilitate rapid testing and iteration, speeding up the development process.
- **Data-Driven Decision-Making:** One of the key advantages of digitalisation is the ability to collect, store, and analyse vast amounts of data. Organisations can leverage these insights to make data-driven decisions, improving innovation strategies and addressing market demands more effectively. By tracking customer feedback, market trends, and performance data, businesses can refine their offerings, reduce risks, and optimise the impact of their innovations.
- **Scalability and Integration:** As companies scale their innovations, digital solutions provide the necessary tools to manage larger, more complex projects. Integrated platforms allow teams to track progress, manage resources, and ensure consistent quality across different geographies. The scalability of digital tools ensures that organisations can expand their innovations smoothly while maintaining high standards of efficiency, compliance, and collaboration.
- **Efficient Innovation Portfolio Management**: Digital Tools support the process of collecting ideas from different sources, store them within organisations and make informed choices on the time and scope of new solutions implementation; thus they help organisation balance the needs to adapt their current products and services to the evolving markets as well as the needs to develop forward looking long-term innovation projects just in time.

The integration of digital tools into the innovation process enables businesses to accelerate product development, foster collaboration, and make more informed, data-driven decisions. By leveraging digital solutions across all phases of innovation, companies can improve their operational efficiency, scale their innovations effectively, and remain agile in a competitive marketplace. This holistic approach to innovation management not only drives business success but also paves the way for more sustainable and future-ready operations.

DIGITALISATION OF INNOVATION MANAGEMENT

This list highlights tools for different stages of innovation management, including idea generation, collaboration, project execution, and market analysis. Many of these solutions integrate seamlessly, making them suitable for enterprises looking to implement end-to-end innovation management.

Idea Generation and Crowdsourcing

- ❑ **Brightidea**: Supports crowdsourcing, idea ranking, and innovation pipeline management.
- ❑ **Braineet**: Focuses on collaborative idea-sharing and crowdsourcing with an emphasis on real-time feedback.
- ❑ **Ideawake**: Helps collect, prioritise, and implement ideas with a structured workflow.
- ❑ **Ideanote**: Offers tools for collecting, managing, and implementing ideas with an emphasis on team collaboration.
- ❑ **Idea Drop**: Encourages idea sharing and evaluation through intuitive interfaces and gamification.
- ❑ **Qmarkets**: A versatile platform for enterprise-level crowdsourcing and innovation management.
- ❑ **InnovationCloud**: Designed for idea capturing, evaluation, and implementation.
- ❑ **Codigital**: Specializes in crowdsourcing and collaborative editing for idea refinement.
- ❑ **OpenideaL**: Open-source platform for collecting, managing, and refining innovation ideas.

Visual Brainstorming and Mind Mapping

- ❑ **MindMup**: A lightweight, web-based tool for mind mapping and brainstorming.
- ❑ **Mindjet (MindManager)**: Advanced mind mapping and brainstorming tool, great for strategic planning and workflow visualization.
- ❑ **MindMeister**: A cloud-based solution for collaborative mind mapping and idea sharing.
- ❑ **Lucidspark**: A digital whiteboard for brainstorming, collaboration, and process visualisation.
- ❑ **Bluescape**: A visual collaboration tool for brainstorming, creative discussions, and managing innovation processes.

Prototyping and Concept Development

- ❑ **MarvelApp**: Ideal for prototyping and designing user interfaces with collaborative feedback tools.
- ❑ **Canva**: Popular for creating visual content and mockups, useful for presenting innovation ideas.
- ❑ **Figma**: Collaborative design tool for creating prototypes, mockups, and user interface designs.
- ❑ **Sketch**: Focuses on prototyping and design for innovative products.
- ❑ **Adobe XD**: Advanced prototyping and wireframing tool for new concepts.

Specialised Market and Trend Analysis

- ❑ **Innolitics**: Provides insights into the medical device market, helping innovate within this niche.
- ❑ **Statista**: Offers comprehensive market and trend data for identifying innovation opportunities.
- ❑ **Crunchbase**: A valuable tool for researching startups and technological innovation trends.

READ: 18 Best Idea Management Software to Help You Innovate 2025

DIGITALISATION OF INNOVATION MANAGEMENT

This list highlights tools for different stages of innovation management, including idea generation, collaboration, project execution, and market analysis. Many of these solutions integrate seamlessly, making them suitable for enterprises looking to implement end-to-end innovation management.

Data-Driven Insights and Decision-Making

- ❑ **Tableau**: Data visualisation tool for analysing innovation metrics and trends.
- ❑ **Power BI**: Offers business intelligence and analytics to support data-driven innovation strategies.
- ❑ **IBM Watson**: Uses AI and predictive analytics for identifying innovation opportunities and trends.
- ❑ **Innovation Pipeline and Project Management**
- ❑ **Planview Spigit**: Enterprise-grade innovation management tool for crowdsourcing and pipeline management.
- ❑ **Planbox**: Supports agile innovation management by combining idea management, workflows, and analytics.
- ❑ **Innovation Cast**: Helps manage the entire innovation lifecycle, from idea collection to project execution.
- ❑ **InnovationCloud**: Focuses on innovation pipeline management and tracking implementation progress.
- ❑ **ClickUp**: Highly customisable project management platform for tracking innovation workflows.
- ❑ **Aha!**: Combines product road mapping with strategic innovation planning and idea prioritisation.
- ❑ **Productboard**: Focuses on product innovation and aligning roadmaps with customer needs.

Enterprise-Level Innovation Management

- ❑ **Hype Innovation**: A comprehensive solution for managing ideation, collaboration, and innovation portfolios.
- ❑ **Planview IdeaPlace**: Offers tools to manage the innovation process from ideation to execution.
- ❑ **edison365**: Microsoft-based platform that integrates with Office 365 for managing innovation and portfolio projects.
- ❑ **Innovation Cast**: Enterprise-level solution for ideation, pipeline management, and collaboration.

Feedback and Customer-Centric Innovation

- ❑ **Canny**: A feedback management tool for gathering customer insights and improving product innovation.
- ❑ **Brainet**: Supports customer-centric innovation by integrating feedback and ideas from clients.
- ❑ **Productboard**: Focused on gathering customer feedback to align innovation with user needs.

Collaboration and Knowledge Management

- ❑ **Confluence**: A knowledge management platform for documenting innovation processes and collaborative workflows.
- ❑ **Coda**: Combines documents, spreadsheets, and apps for managing innovation tasks and knowledge sharing.
- ❑ **Notion**: A flexible knowledge management tool that organises workflows, tasks, and project ideas.
- ❑ **SharePoint**: Provides collaborative spaces for sharing and managing innovation documentation.

End-to-End Innovation Management Solutions

- ❑ **Brightidea**: Comprehensive platform for managing the innovation lifecycle.
- ❑ **Hype Innovation**: Tailored for large enterprises to manage every stage of innovation.
- ❑ **InnovationCloud**: A holistic tool for idea collection, evaluation, and pipeline management.
- ❑ **edison365**: Combines portfolio management with innovation lifecycle capabilities.

DIGITALISATION OF INNOVATION MANAGEMENT

As the innovation process can be divided into six stages **(Innovation opportunity identification, Ideation and idea management, Concept Development**, **Product/Service/Process Development**, **Testing and Validation**, and **Commercialization),** each stage can be supported by specific IT tools that streamline processes, enhance collaboration, and improve outcomes. Thus the dedicated tools and their functionalities can be matched to these stages.

By aligning the tools to the innovation process activities, organizations can ensure efficiency, collaboration, and strategic orientation from ideation to commercialization. **This approach takes into consideration that specific stages and activities within those stages might differ from business to business. Therefore usability of a particular tool depends on the business needs.**

The table below summarises the IT tools as aligned with the subsequent process stages. A more detailed tools breakdown is provided on the next page.

Organisations can leverage a combination of tools to create a seamless innovation pipeline:

End-to-End Tools: Tools like **Brightidea**, **Planbox**, **InnovationCloud**, and **Planview Spigit** provide comprehensive support across multiple stages.

Specialised Tools: Tools like **MarvelApp**, **Canva**, and **Figma** focus on prototyping and design, while others like **Qmarkets** and **Ideanote** excel in crowdsourcing and idea management.

Collaborative Platforms: Tools such as **ClickUp**, **Lucidspark**, and **Bluescape** enhance teamwork and collaboration.

Innovation Process Stage	Tools
Innovation opportunity identification	Innolitics, Tableau, Power BI, Statista, Qmarkets, Brightidea, Innovation Cast, Bluescape, Coda, Mindjet
Ideation and idea management	Brightidea, Braineet, Ideawake, Ideanote, Idea Drop, Codigital, Qmarkets, MindMeister, Lucidspark, InnovationCloud
Concept Development	MarvelApp, Canva, Figma, Adobe XD, Sketch, Lucidspark, ClickUp, Monday.com, Asana, InnovationCloud
Product/Service/Process Development	MarvelApp, Adobe XD, Figma, Sketch, Brightidea, Braineet, Canny, InnovationCloud, Coda, Notion
Testing and Validation	Ideanote, Idea Drop, Braineet, Productboard, Tableau, Power BI, Brightidea, Lucidspark, Planbox
Commercialization	edison365, Planbox, ClickUp, Monday.com, Asana, Brightidea, Planview Spigit, Confluence, Notion, Coda

DIGITALISATION OF INNOVATION MANAGEMENT

Innovation process stages breakdown of IT Tools

Below the selected IT tools have been assigned to the subsequent stages of innovation process, and related to some most important innovation management activities.

1. INNOVATION OPPORTUNITY IDENTIFICATION

Understanding development directions by gathering, organising, and analysing information about customer needs, market trends, and economic data might include:

- Market and Trend Analysis supported by:
  - **Statista**, **Crunchbase**, **Tableau**, **Power BI**, **IBM Watson**: Provide detailed market insights by integrating internal and external databases.
  - **Innovation Cast**, **Innolitics**: Focus on industry-specific scanning (e.g., medical devices).
  - **MindMeister**, **Mindjet**: Facilitate mapping and brainstorming opportunities.
- Data Collection and Repository supported by :
  - **InnovationCloud**, **Canny**, **OpenideaL**: Collect and analyze customer needs in digital repositories.
  - **Qmarkets**, **Ideawake**: Support structured information collection and prioritize opportunities.

2. IDEATION AND IDEA MANAGEMENT

Generating, collecting, and managing new ideas while engaging broader stakeholder groups might involve:

- Crowdsourcing and Brainstorming supported by :
  - **Brightidea**, **Braineet**, **Idea Drop**, **Ideawake**, **Ideanote**, **Codigital**: Enable idea crowdsourcing and electronic brainstorming.
  - **Lucidspark**, **MindMeister**, **Bluescape**, **MindMup**: Offer visual collaboration platforms for brainstorming.
- Idea Collection and Workflow Management supported by:
  - **Qmarkets**, **Planbox**, **InnovationCloud**, **edison365**: Streamline idea workflows, prioritize submissions, and manage innovation funnels.
  - **HypeInnovation**, **Aha!**, **ClickUp**, **Productboard**: Organize idea repositories, track progress, and analyze feedback.

3. CONCEPT DEVELOPMENT

Refining ideas into detailed concepts through collaboration, prototyping, and testing might include:

- Prototyping and Testing supported by:
  - **MarvelApp**, **Canva**, **Adobe XD**, **Figma**, **Sketch**: Support digital and physical prototyping with user testing.
  - **Bluescape**, **Lucidspark**: Enable team collaboration on concept refinement.
  - **Brightidea**, **InnovationCloud**, **Idea Drop**: Integrate feedback collection and concept validation in real-time.
- Task and Collaboration Management supported by:
  - **ClickUp**, **Planbox**, **Planview Spigit**, **Monday.com**, **Aha!**: Assign responsibilities, set deadlines, and track progress to ensure timely results.

DIGITALISATION OF INNOVATION MANAGEMENT

Innovation process stages breakdown of IT Tools

Below the selected IT tools have been assigned to the subsequent stages of innovation process, and related to some most important innovation management activities.

4. PRODUCT/SERVICE/PROCESS DEVELOPMENT

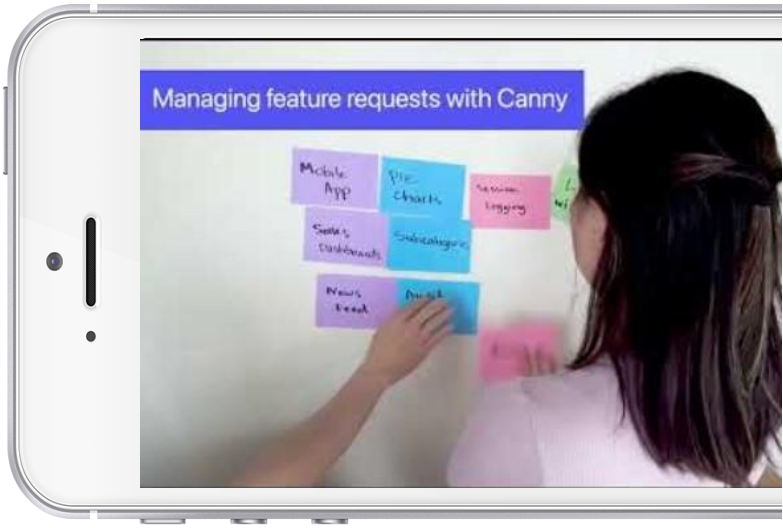
Turning concepts into business models and ensuring alignment with stakeholder expectations might involve:

- Project Management supported by :
  - **ClickUp**, **Monday.com**, **Asana**, **edison365**, **Planbox**: Track team activities, allocate resources, and estimate costs.
  - **Coda**, **Confluence**, **SharePoint**: Real-time collaboration on documents, templates, and business reports.
- Simulation and Business Modeling supported by :
  - **MarvelApp**, **Sketch**, **Figma**: Simulate user interactions and validate designs.
  - **Brightidea**, **Planview Spigit**: Provide templates for business modeling and scenario planning.

5. TESTING AND VALIDATION

Creating a complete solution model, testing it in real environments, and gathering feedback to refine the product might include:

- User Testing and Feedback supported by :
  - **MarvelApp**, **Adobe XD**, **Figma**, **Sketch**: Create high-fidelity prototypes for user interaction.
  - **Canny**, **Braineet**, **Productboard**: Collect, prioritize, and analyze feedback from test scenarios.
- Portfolio and Risk Management supported by :
  - **Planview Spigit**, **Brightidea**, **edison365**: Enable portfolio analysis, risk management, and strategy alignment.
  - **Power BI**, **Tableau**, **IBM Watson**: Generate stakeholder-specific reports from testing results.



6. COMMERCIALIZATION

Coordinating full-scale production, market entry, and aligning innovation with business strategy might require:

- Centralized Project Management supported by :
  - **ClickUp**, **Asana**, **Monday.com**, **edison365**: Consolidate documentation and streamline communication among stakeholders.
  - **InnovationCloud**, **Planbox**, **Planview Spigit**: Provide insights into innovation portfolios and facilitate commercialization strategies.
- Operations and Analytics supported by :
  - **Power BI**, **Tableau**, **IBM Watson**: Support data-driven decisions with real-time analytics.
  - **Brightidea**, **HypeInnovation**, **Qmarkets**: Ensure seamless integration of commercialization processes with operational goals.

INNOVATIVE DIGITAL SOLUTIONS

The next table presents in more detail which digital tools can support the particular activities in innovation process. Each stage of innovation process has benn further broken down into 10 specific activities.

Innovation management activities in the enterprise	Possible digital tools to assist in the stage
STAGE 1: IDENTIFYING OPPORTUNITIES FOR INNOVATION	
1.1 obtaining information about customers' needs indirectly?	Braineet, Designcrowd, HypeInnovation, InnocationCast, InnovationCloud, Itonics, Planbox, Qmarkets, Sopheon, Talkfreely
1.2 obtaining information about customer needs directly?	
1.3 obtaining information on market, socio-economic and technological trends?	
1.4 obtaining information about new scientific discoveries?	
1.5 keeping records of information about customer needs, trends and scientific discoveries?	
1.6 keeping records of knowledge resulting from in-house R&D activities and market research?	
1.7 analysing information about customer needs, trends and scientific discoveries in order to identify future opportunities for innovation?	Braineet, HypeInnovation, InnocationCast, InnovationCloud, Itonics, Qmarkets, Sopheon
1.8 creating strategic maps of innovation?	
1.9 managing teamwork, communication and discussion supporting the identification of innovation opportunities and defining innovation strategic maps?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind
1.10 managing the flow of information on innovation opportunities inside and outside the organization?	

INNOVATIVE DIGITAL SOLUTIONS

Innovation management activities in the enterprise	Possible digital tool(s) to assist in the stage
STAGE 2: IDEA GENERATION AND IDEA MANAGEMENT	
2.1 collecting managers and/or special groups ideas (for instance interdisciplinary teams) for new or improved products, services or processes?	Acuvate, Braineet, Crowdworx, Exago, Innolitics, InnnovationCast, InnovationCloud, Itonics, HypeInnovation, Planbox, PPMExpress, Prodyctplan, OpenIdeaApp, Qmarkets, Reverscore, Sideways 6, Sopheon, Talkfreely, To Ground, Vilma, Yambla
2.2 collecting employees ideas for new or improved products, services or processes?	
2.3 collecting experts ideas on how products, services or processes could be improved or renowned?	Braineet, InnnovationCast, InnovationCloud, HypeInnovation, Qmarkets, Sopheon, Talkfreely
2.4 collecting customers ideas for new or improved products, services or processes?	Braineet, InnnovationCast, InnovationCloud, HypeInnovation, Qmarkets, Sopheon, Talkfreely, Use Response
2.5 analysing and organizing ideas for new or improved products, services or processes?	Braineet, HypeInnovation, InnocationCast, InnovationCloud, Itonics, Qmarkets, Sopheon
2.6 evaluating and selecting the best ideas by managers and/or special groups?	Acuvate, Braineet, Crowdworx, Exago, HypeInnovation, InnovationCast, Innolitics, InnovationCloud, Itonics, Mockplus, OpenIdeaApp, PPMExpress, Qmarkets, Reverscore, Sideways 6, Sopheon, Use Response, Talkfreely, Vilma, Yambla
2.7 evaluating and selecting the best ideas by employees?	
2.8 evaluating and selecting the best ideas by customers?	
2.9 facilitating the process of selecting ideas and defining a portfolio of ideas planned for development in a short and long term?	Braineet, Crowdworx, Exago, HypeInnovation, InnovationCast, Innolitics, InnovationCloud, Itonics, PPMExpress, Qmarkets, Reverscore, Sideways 6, Sopheon, To Ground
2.10 managing the flow of ideas inside and outside the organisation?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind

INNOVATIVE DIGITAL SOLUTIONS

Innovation management activities in the enterprise	Possible digital tool(s) to assist in the stage
STAGE 3: CONCEPT DEVELOPMENT	
3.1 defining work packages around development of selected new ideas and organising the work of teams responsible for specific concepts development?	Crowdworx, HypeInnovation, InnovationCast, Itonics, PPMExpress, Prodycplan, Qmarkets, Sopheon, Talkfreely, Vilma
3.2 collecting and organising necessary additional information around selected ideas and facilitating further targeted ideation process?	Acuvate, Braineet, Crowdworx, Exago, HypeInnovation, InnovationCast, Innolitics, InnovationCloud, Itonics, Mockplus, OpenIdeaApp, PPMExpress, Qmarkets, Reverscore, Sideways 6, Sopheon, Use Response, Talkfreely, Vilma, Yambla
3.3 analysing information around selected ideas, comparing and selecting concepts?	
3.4 creating concept descriptions and/or first prototypes of new solutions?	Axure, Braineet, Designcrowd, Figma, Fluidld, Justinmind, Mockplus, Moqups, Mural, PPMExpress, Protopie, Proto io, Smartdraw, Sopheon, UXpin
3.5 demonstrating prototypes to chosen groups?	Braineet, Crowdworx, Exago, HypeInnovation, Innolitics, InnovationCast, InnovationCloud, Itonics, PPMExpress, Qmarkets, Reverscore, Sideways 6, Sopheon, To Ground
3.6 testing prototypes of new concepts within the organization?	Braineet, InnovationCast, Mockplus, To Ground
3.7 testing prototypes of new concepts with key customers?	
3.8 testing prototypes of new concepts with key partners and project stakeholders	
3.9 keeping records and analysing information from tests, refining concepts?	Acuvate, Braineet, Crowdworx, Exago, HypeInnovation, Innolitics, InnovationCast, InnovationCloud, Itonics, Mockplus, OpenIdeaApp, PPMExpress, Qmarkets, Reverscore, Sideways 6, Sopheon, Use Response, Talkfreely, Viima, Yambla
3.10 managing the flow of information around new concepts inside and outside the organisation?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind

INNOVATIVE DIGITAL SOLUTIONS

Innovation management activities in the enterprise	Possible digital tool(s) to assist in the stage
STAGE 4: PRODUCT/SERVICE/PROCESS DEVELOPMENT	
4.1 designing a new service/product/process, crafting and sharing their detailed descriptions?	HypeInnovation, InnovationCast, Itonics, PPMExpress, Prodycplan, Qmarkets, Sopheon, Talkfreely, Vilma
4.10 managing the flow of information on new solutions development inside and outside the organisation?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind
STAGE 5: TESTING AND VALIDATION	
5.7 facilitating financial planning and risk analysis for new or improved product/service/process?	HypeInnovation, InnovationCast, Itonics, Sopheon, To Ground, Yambla
5.10 managing the flow of information on pilot testing inside and outside the organisation?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind
STAGE 6: IMPLEMENTATION/COMMERCIALISATION	
6.1 defining work packages around the innovation rollout process, organising the work of teams responsible for specific activities?	Crowdworx, HypeInnovation, InnovationCast, Itonics, PPMExpress, Prodycplan, Qmarkets, Sopheon, Talkfreely, Vilma
6.9 crafting and simulating modifications in the market strategy, functionalities, usage of a new or improved product, service, or process?	Axure, Braineet, Designcrowd, Figma, Fluidld, Justinmind, Mockplus, Moqups, Mural, PPMExpress, Protopie, Proto io, Smartdraw, Sopheon, UXpin
6.10 managing the flow of information on commercialisation inside and outside the organisation?	Ayoa, ClickUp, Edraw Mind Map, Lucidchart, Milanote, Miro, Mural, Simplemind, Trello, Whimsical, Xmind

The impact of digitalisation of innovation management on sustainability

INNOVATE DIGITALLY FOR HIGHER SUSTAINABILITY

Digitalisation of innovation management activities can leverage the integration of sustainability principles at all stages of the innovation process.

How?

- Digital tools improve internal and external information flow, enabling better teamwork and **stakeholder engagement**.
- Digital solutions streamline the **analysis of market performance, resource usage, and compliance with sustainability goals**.
- Digital tools support faster decision-making, better organization, and **scalability for sustainable innovation**.

By integrating sustainability principles into every stage, digital solutions help organizations align innovation management with long-term environmental, social, and economic goals.

INNOVATION DIGITALISATION AND SUSTAINABILITY

Digitalisation of any activity in the innovation proces might contribute to higher sustainability enforcement in innovative initiatives. Here are the hightlights of key benefits.

1. INNOVATION OPPORTUNITY IDENTIFICATION

Key Activities: Collecting and analyzing customer needs, market trends, scientific discoveries, and internal knowledge. Using tools like concept maps and knowledge management systems to identify innovation opportunities.

Sustainability Focus: Align opportunities with Sustainable Development Goals (SDGs), emphasize resource optimization, and track external sustainability requirements.

Benefits of Digital Solutions: Wider scope of market exploration, long-term information storage and sharing, and structured analytical processes for sustainability-oriented criteria.

2. IDEATION AND IDEA MANAGEMENT

Key Activities: Crowdsourcing ideas internally and externally, organizing and categorizing ideas, and evaluating them using structured criteria.

Sustainability Focus: Ensure collected ideas focus on sustainability, include diverse employee and customer groups, and integrate sustainability into the evaluation process.

Benefits of Digital Solutions: Ease of entering and enforcing sustainability criteria, inclusive innovation policies, transparency, and uniformity in evaluations.

3. CONCEPT DEVELOPMENT

Key Activities: Develop action plans, gather additional information, create prototypes, test with stakeholders, and analyze results for refinement.

Sustainability Focus: Integrate sustainability into concept descriptions, testing processes, and stakeholder engagement.

Benefits of Digital Solutions: Faster access to information, better collaboration, effective visualization of concepts, and more structured criteria for sustainability.

4. PRODUCT/SERVICE/PROCESS DEVELOPMENT

Key Activities: Design new solutions, build business models, simulate solutions, and manage stakeholder collaboration.

Sustainability Focus: Develop sustainable practices, optimize resource usage, and engage underprivileged groups in the design process.

Benefits of Digital Solutions: Efficient process management, improved communication, and faster validation of sustainable practices.

5. TESTING AND VALIDATION

Key Activities: Plan and execute pilot tests, collect and analyze feedback, and refine innovations based on results.

Sustainability Focus: Include sustainability criteria in testing and feedback collection, and optimize resource usage in the process.

Benefits of Digital Solutions: Efficient organization and execution, structured criteria implementation, and streamlined feedback processes.

6. COMMERCIALIZATION

Key Activities: Plan and manage implementation, establish and maintain customer and supplier relationships, monitor performance, and adapt market strategies.

Sustainability Focus: Align implementation with sustainable development goals, establish eco-friendly partnerships, and integrate sustainability into performance evaluations and future decisions.

Benefits of Digital Solutions: Efficient process management, easier relationship maintenance, and better monitoring and reporting.

Sustainability-focused IT solutions

Sustainability is a critical consideration in modern innovation management, emphasizing environmental, social, and governance (ESG) factors**. IT solutions designed for innovation management increasingly integrate features that address sustainability challenges**. These tools help organizations **align their innovation efforts with sustainability goals, measure impact, and ensure compliance with ESG standards**.

Below is an extension of the sustainability-focused IT solutions, detailing their functionalities and alignment with the stages of the innovation process.

SAP Sustainability Control Tower
Integrates sustainability metrics into innovation projects and tracks ESG performance:
- Aligns innovation portfolios with sustainability goals.
- Offers dashboards to monitor carbon footprints, energy use, and waste reduction.
- Supports scenario analysis for sustainable decision-making.

Relevant for: Opportunities Identification, Testing and Validation, Commercialization.

Enablon
Provides comprehensive tools for managing environmental, social, and governance data:
- Tracks environmental performance across innovation projects.
- Offers risk management for environmental compliance and safety.
- Provides insights for achieving net-zero and circular economy goals.

Relevant for: Opportunities Identification, Concept Development, Product Development.

EcoVadis
Evaluates and monitors sustainability performance in innovation and supply chains:
- Delivers sustainability scorecards for innovation projects.
- Evaluates supplier practices to ensure sustainable sourcing.
- Enables data-driven decisions in material selection and process improvements.

Relevant for: Idea Generation and Management, Testing and Validation, Commercialization.

SpheraCloud
Specializes in sustainability and product lifecycle management (PLM) with a focus on ESG compliance:
- Monitors product lifecycle impacts, from raw materials to disposal.
- Assesses environmental impacts of proposed innovations.
- Supports detailed reporting for regulatory compliance and sustainability certifications.

Relevant for: Concept Development, Product Development, Testing and Validation.

OneTrust ESG and Sustainability Cloud
Manages sustainability programs and reporting for innovation portfolios:
- Aligns innovation initiatives with corporate ESG goals.
- Automates sustainability reporting (e.g., GRI, SASB, CDP).
- Tracks progress on decarbonization, renewable energy adoption, and water use.

Relevant for: Opportunities Identification, Testing and Validation, Commercialization.

GreenProjectManagement (GPM P5 Standard)
Integrates sustainability principles into project management practices:
- Embeds social and environmental impact metrics into project plans.
- Offers frameworks for balancing economic, environmental, and societal value.
- Encourages sustainable resource allocation and risk management.

Relevant for: Product Development, Testing and Validation, Commercialization.

Measurabl
Tracks and manages ESG performance at project and organizational levels:
- Offers tools for energy efficiency tracking and emissions reporting.
- Integrates sustainability performance data into innovation workflows.
- Supports real-time monitoring of progress toward sustainability KPIs.

Relevant for: Opportunities Identification, Testing and Validation, Commercialization.

Circular IQ
Focuses on circular economy principles and sustainable resource use:
- Assesses material circularity in innovation projects.
- Tracks resource efficiency and waste reduction initiatives.
- Encourages closed-loop processes in product development.

Relevant for: Concept Development, Product Development, Commercialization.

READ: Effects of Digital Innovation on Sustainable Operations of Logistics

Sustainability -focused IT solutions Integration Across Innovation Stages - summary

1. INNOVATION OPPORTUNITY IDENTIFICATION

Tools like **SAP Sustainability Control Tower**, **BreezoMeter**, and **Measurabl** enable organizations to assess environmental trends and sustainability risks during the opportunity identification phase.

2. IDEATION AND IDEA MANAGEMENT

Platforms such as **EcoVadis** and **Enablon** incorporate sustainability criteria into idea evaluation and prioritize green innovation initiatives.

3. CONCEPT DEVELOPMENT

Solutions like **GaBi Software** and **SpheraCloud** support sustainable concept design by providing LCA data and environmental modeling.

4. PRODUCT/SERVICE/PROCESS DEVELOPMENT

Tools like **Circular IQ** and **GPM P5 Standard** ensure resource-efficient development processes, reducing waste and promoting circular economy practices.

5. TESTING AND VALIDATION

Platforms such as **EcoVadis** and **SpheraCloud** validate innovation sustainability through metrics like carbon footprints and energy efficiency.

6. COMMERCIALIZATION

Solutions like **OneTrust ESG** and **SAP Sustainability Control Tower** align final product launches with corporate ESG strategies and market sustainability standards.

Sustainability priorities assigned to stages of the innovation process with consideration of the benefits of digital solutions

By assigning a focus on sustainable priorities to the various stages of the innovation process and the activities identified within it, it becomes possible to consider sustainable growth objectives for each specific activity. Additionally, this approach provides a clear perspective on the implications of digitising the innovation process to achieve sustainable innovation outcomes. The details of the analysis conducted are presented in the table below.

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STAGE 1: IDENTIFYING OPPORTUNITIES FOR INNOVATION		
1.1 obtaining information about customer needs indirectly	Mainstream sustainability and SDG awareness when exploring markets and seeking opportunities.	Broader market exploration to understand solutions and needs in distant regions.
1.2 obtaining information about customer needs directly	Mainstream sustainability and SDG awareness when exploring markets and seeking opportunities.	Broader market exploration to understand solutions and needs in distant regions.
1.3 obtaining information on market, socioeconomic, technological trends	Identify cooperation opportunities to support developing countries.	Broader market exploration to understand solutions and needs in distant regions.
1.4 obtaining information about new scientific discoveries	Track methods and technologies for cost reduction, market expansion, and resource efficiency.	Broader market exploration to understand solutions and needs in distant regions.
1.5 keeping records of information about customer needs, trends and scientific discoveries	Monitor external sustainability requirements (e.g., new regulations).	Organise and categorise collected information for long-term storage and easy sharing.
1.6 keeping records of knowledge resulting from in-house R&D activities and market research?	Collect data on process optimisation, considering environmental, cost, and human factors.	Organise and categorise collected information for long-term storage and easy sharing.
1.7 analysing information about customer needs, trends and scientific discoveries in order to identify future opportunities for innovation	Introduce pro-sustainability criteria in market opportunity information analysis processes	Ease of implementing structured analytical criteria and adapting them to changing needs
1.8 creating strategic maps of innovation (e.g. defining and drafting innovation 'buckets', innovation roadmapping)?	Integrate pro-sustainability criteria into strategic innovation mapping processes.	Ease of implementing structured categorization criteria and adapting them to changing needs
1.9 managing teamwork, communication and discussion supporting the identification of innovation opportunities and defining innovation strategic maps?	Weighting of sustainability criteria in strategic maps of innovation areas	Ease of implementing structured selection criteria and adapting them to changing needs
1.10 managing the flow of information on innovation opportunities inside and outside the organization?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STAGE 2: IDEA GENERATION AND IDEA MANAGEMENT		
2.1 collecting managers and/or special groups ideas (for instance interdisciplinary teams) for new or improved products, services or processes	Ensure focus on sustainability of innovation project ideas collected at different levels	Ease of entering criteria and controlling their enforcement
2.2 collecting employees ideas for new or improved products, services or processes?	Focus on sustainability in innovation projects at all levels. Implement crowdsourcing projects addressing sustainability. Adopt inclusive innovation policies in the enterprise.	Ease of entering criteria and controlling their enforcement Greater ease of inclusion of different groups of employees
2.3 collecting experts ideas on how products, services or processes could be improved or renowned?	Focus on sustainability in innovation projects at all levels. Implement crowdsourcing projects addressing sustainability.	Ease of entering criteria and controlling their enforcement
2.4 collecting customers ideas for new or improved products, services or processes?	Focus on sustainability in innovation projects. Implement crowdsourcing for sustainability issues. Reach underprivileged customer groups.	Ease of entering criteria and controlling their enforcement; Greater ease of reaching underprivileged customer groups
2.5 analysing and organizing ideas for new or improved products, services or processes?	Introduce sustainability-related criteria into the idea analysis and selection process	Simplify categorisation and organisation of ideas; adapt analytical criteria to changing needs.
2.6 evaluating and selecting the best ideas by managers and/or special groups?	Introduce sustainability-related criteria into the idea analysis and selection process	Simplified integration of criteria into evaluation tools, ensuring transparency, consistency, and adaptability over time.
2.7 evaluating and selecting the best ideas by employees (e.g. by commenting, scoring, voting)?	Introduce sustainability-related criteria into the idea analysis and selection process Ability to implement inclusive innovation policies in the enterprise	Simplified integration of criteria into evaluation tools, ensuring transparency, consistency, and adaptability over time.
2.8 evaluating and selecting the best ideas by customers (e.g. by commenting, scoring, voting)?	Introduce sustainability-related criteria into the idea analysis and selection process Ability to reach underprivileged customer groups	Simplified integration of criteria into evaluation tools, ensuring transparency, consistency, and adaptability over time. Greater ease of reaching underprivileged customer groups
2.9 facilitating the process of selecting ideas and defining a portfolio of ideas planned for development in a short and long term?	Include sustainability criteria in the definition of the innovation project portfolio	Ease of implementing structured selection criteria and adapting them to changing needs
2.10 managing the flow of ideas inside and outside the organisation?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STAGE 3: CONCEPT DEVELOPMENT		
3.1 defining work packages around development of selected new ideas and organising the work of teams responsible for specific concepts development	Adding sustainability to concept development requirements/criteria	Ease of collection and sharing of accepted assumptions, ability to effectively collaborate among teams
3.2 collecting and organising necessary additional information around selected ideas and facilitating further targeted ideation process?	Gathering information on teamt ideas with sustainability in mind	Easier access to information
3.3 analysing information around selected ideas (e.g. drawing utility maps), comparing and selecting concepts?	Gather information on the most relevant sustainability issues and use it to develop innovation concepts	Easier access to information and implementation of acquired information
3.4 create descriptions and first prototypes of new concepts	Include sustainability in descriptions and prototypes	Using modern technology to effectively visualize new concepts
3.5 demonstrating prototypes to chosen groups?	Demonstrate prototypes of new concepts with sustainability-oriented stakeholder groups	Ability to organize preferred customer groups faster
3.6 testing prototypes of new concepts within the organisation	Integration of sustainability criteria into the testing process	More effective application of selected criteria
3.7 testing prototypes of new concepts with key customers	Prototyping with disadvantaged client groups to develop inclusive solutions	Ability to organize preferred customer groups faster
3.8 test prototypes of new concepts with key project partners and stakeholders	Testing prototypes of new concepts with key partners in orientation of current needs for applied sustainable solutions	Ease of collecting and sharing information (legal requirements for environmental regulations, possible technical solutions, etc.).
3.9 keeping records and analysing information from tests, refining concepts?	Analyze test results with sustainability-oriented criteria in mind	Effective verification of the adopted criteria
3.10 managing the flow of information around new concepts inside and outside the organisation?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)
STAGE 4: DEVELOPING PRODUCTS/SERVICES/PROCESSES		
4.1 designing a new service/product/process, crafting and sharing their detailed descriptions (functional, technical, process architecture)?	Collect sustainable practices in resource efficiency, human involvement, and equality to guide product, service, or process development.	Easier to organize the process
4.2 crafting and validating user interface design and user interaction plan?	Integration of sustainability criteria into the testing process Inclusion of underprivileged customer groups in the process	Easier to organize and control the process

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STAGE 4: DEVELOPING PRODUCTS/SERVICES/PROCESSES		
4.3 simulating and verifying a new service/product/process fit into the internal and external systems; designing systems that allow and sustain new user experience?	Provide verification of sustainable systems designed/adopted innovative solutions.	Efficiently organize and control the verification process
4.4 crafting and analysing business models/concepts & marketing and operations plans; validating business feasibility and viability?	Seeking innovative (more sustainable) business models and exploring cost-effective or breakthrough innovation concepts.	Easier process management
4.5 simulating and verifying a new service/product/process in use case scenarios and/or with respect to process efficiency and reliability internally?	Verify alignment with criteria from earlier stages that support sustainable development goals.	Efficient organization of the process, easier communication and quick feedback
4.6 simulating and verifying a new service/product/process in use case scenarios and/or with respect to process efficiency and reliability with key partners and project stakeholders?	Ensure collaborative innovation development with existing and potential stakeholders	Fast communication and information exchange
4.7 collecting, organising and analysing information needed to develop a complete version of new or improved service/product/process?	Ensure effective use of resources to implement new products, services or processes	Efficient management of the process
4.8 engaging customers and other stakeholders in co-creation activities?	Engage with customers and other sustainability-oriented stakeholders to develop innovations	Fast communication and information exchange
4.9 integrating internal stakeholders working simultaneously on various aspects of new concepts development and validation?	Ensure integrated activities in the development of a new solution with consideration of aspects such as the environment	Effective process management. Better integration of activities.
4.10 managing the flow of information on new solutions development inside and outside the organisation?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)
STEP 5: TESTING AND VALIDATION		
5.1 planning pilot testing activities with customers and users	Involve more disadvantaged customer groups in pilot testing	More efficient organization and execution of the process.
5.2 designing pilot testing operations	Adding sustainability criteria to pilot tests	Ease of adapting structured analytical criteria to user needs.
5.3 facilitating pilot testing process	Include sustainability solutions, criteria, and practices in the testing process.	More efficient organization and execution of the process.
5.4 collecting and keeping records of information from pilot testing?	Collect feedback based on predefined criteria, including sustainability.	More efficient organization and execution of the process.

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STEP 5: TESTING AND VALIDATION		
5.5 analysing information from pilot testing and refining planned innovations?	Include sustainability-related criteria in the process of analyzing information after pilot tests	Ease of considering and implementing structured analytical criteria and adapting them to user suggestions
5.6 developing the final product/service/process architecture; developing and sharing final descriptions?	Integrate sustainability criteria in final product/service/process development and sharing.	Effectively organize and execute the process.
5.7 facilitating financial planning and risk analysis for new or improved product/service/process?	Include the company's pro-sustainable priors in the financial planning process	Easier and more meticulous process
5.8 developing final business plans and marketing strategies for new or improved product/service/process?	Integrate sustainability into business plans and marketing strategies	More efficient execution of the process, more effective communication and exchange of information and insights
5.9 crafting plans for new or improved product/service/process rollout?	Integrate sustainability considerations into plans for implementing a new or improved product	More efficient communication within the organization. Facilitated access to the current version of the plan
5.10 managing the flow of information on pilot testing inside and outside the organisation?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)
STEP 6: IMPLEMENTATION/COMMERCIALIZATION		
6.1 defining work packages around the innovation rollout process, organising the work of teams responsible for specific activities?	Ensure sustainable practices when organizing the process in terms of efficient use of resources, involvement of people, equality issues, etc...	Effective process management
6.2 facilitating internal communication and collaboration related to new or improved product, service or process rollout?	Ensure sustainable practices when organizing the process in terms of efficient use of resources, involvement of people, equality issues, etc...	More efficient communication, information exchange, etc.
6.3 establishing and/or maintaining relationships with suppliers and/or partners collaborating on innovation delivery and/or implementation?	Use sustainable practices in establishing partnerships and collaborations	Establish and maintain relationships more easily More efficient flow of information
6.4 establishing and/or maintaining relationships with innovation customers and/or users?	Ensure sustainable practices in maintaining relationships with customers and/or users of innovations	Easier to establish and maintain contact with customers
6.5. managing the sale and/or usage of a new or improved product, service or process?	Ensure that the product or service is sold in accordance with defined strategies related to sustainable development	More efficient management of the process, in line with the adopted strategy.

Innovation management activities in the enterprise	Complementary activities to promote the needs of sustainable development	Benefits of using digital solutions
STEP 6: IMPLEMENTATION/COMMERCIALIZATION		
6.6 monitoring the market results, revenues and costs related to a new or improved product, service or process, monitoring the innovation life cycle?	Include sustainability criteria in the procedure for evaluating the performance of the innovation market	Facilitated ongoing monitoring and control. More effective monitoring according to accepted criteria
6.7 analysing the market results, revenues and costs related to a new or improved product, service or process in the context of enterprise's innovation portfolio?	Integrate sustainability criteria into market performance analysis and align results with the innovation strategy for future development decisions.	Effectively carry out the analysis process. Easier to obtain relevant information
6.8 reporting and distributing information about market results, revenues and costs related to a new or improved product, service or process?	Analyze market results, considering the sustainability impact of adopted solutions.	Effective analysis of the obtained data, ease of preparing reports according to various criteria Facilitated analysis and dissemination of information
6.9 crafting and simulating modifications in the market strategy, functionalities, usage of a new or improved product, service, or process?	Include (adopt, change, abandon) sustainability criteria in modified market strategy	Effective execution of the process, implementation of any changes
6.10 managing the flow of information on commercialisation inside and outside the organisation?	Communicating the company's pro-sustainable priorities internally and externally	Ease of information flow and, at the same time, exercise control over this flow (e.g., by defining self-controlling access levels)

DIGITALISATION OF INNOVATION MANAGEMENT DRIVES SUSTAINABILITY IN LOGISTICS

A detailed analysis shows that **innovation processes in companies can be directed to include elements of sustainability** in its three dimensions: economic, social and environmental. This applies to many key elements of the process. Even at its early stages, such as analyzing the needs of potential customers for the possibility of introducing new or improved products/services, collecting and selecting ideas, or drafting concepts, a company can **introduce criteria that will make projects more sustainable** and **the process itself can be more sustainable**. Other activities related to, for example, contacting stakeholder groups, organizing the work of teams, managing the entire process at its various stages, or testing and implementing products or services can be carried out in a way that will make them more sustainable and the results produced will contribute to both the sustainability of the company's operations and the achievement of sustainability goals. In addition, activities undertaken in the process of introducing or improving products/services can be done more efficiently using digital tools. The benefits of their use include: efficient management of the entire process, fast and effective communication inside and outside the organization with selected stakeholders, efficient cooperation between teams, resource savings, which can also influence even better sustainability orientation.

KEY TAKEAWAYS

In today's rapidly evolving business landscape, **digital solutions have become integral to driving innovation across various industries**. Technology adoption for innovation is associated with **significant improvements in environmental sustainability**, particularly when fully integrated into daily operations.

Within the realm of logistics, where efficiency, agility, and sustainability are critical, digitalisation drives positive influences, impacting people and the environment.

Innovation management tools may help organisations navigate complex supply chains, optimise operations, and reduce inefficiencies. These tools are designed to **streamline the innovation process by fostering collaboration, idea generation, and data-driven decision-making**, all of which are essential for maintaining a company's competitiveness. They not only can **enhance logistical performance but also align with the SDGs**.

By leveraging these digital platforms, logistics companies can, e.g., create and implement innovative solutions that minimise environmental impact, promote resource efficiency, and reduce carbon emissions – key objectives for achieving sustainability in the sector.

As sustainability becomes increasingly critical, the **integration of digital solutions in innovation management proves vital in driving long-term growth and environmental responsibility in logistics**.

05

TEACHING INNOVATION IN LOGISTICS

TEACHING LOGISTICS INNOVATION

As the logistics industry evolves rapidly in response to technological advancements and sustainability challenges, the role of education becomes crucial in shaping the future of logistics management. This section focuses on the transformative potential of **integrating sustainability and innovation management into logistics education**. As outlined in the previous sections, **including digital aproaches in innovation management education** will keep the programms up to date and will contribute to produce graduates better prepared to face real market challenges.

By adopting new pedagogical approaches, educational institutions can **equip students with the necessary competencies to not only thrive in their careers but also drive meaningful change within the industry**.

Sustainability and innovation management serve as core pillars in modern logistics education, bridging the gap between theoretical knowledge and practical application. These approaches foster a learning environment where students can develop critical thinking and problem-solving skills pertinent to real-world challenges. Moreover, they encourage the cultivation of digital literacy and sustainable practices, preparing students to contribute effectively to the green transformation of the logistics sector.

This section will explore:

- **Pedagogical Approaches:** How sustainability and innovation management are being integrated into educational frameworks to enhance learning outcomes.
- **Theory and Practice:** The opportunities these modern teaching methods offer for connecting classroom learning with practical industry demands, thereby building a competent and agile workforce.
- **Educational Resources:** The role of EARTH Good Practice Compendium, Open Educational Resources (OERs) in supporting logistics education and the EARTH Benchmarking Platform, which aids institutions in keeping curricula up-to-date and aligned with industry needs

By detailing these elements, this section aims to provide educators, policymakers, and educational institutions with insights and tools to effectively integrate cutting-edge content into logistics programs. This will not only enhance the educational journey of students but also profoundly impact the logistics field by fostering a new generation of professionals equipped to tackle the challenges of sustainability and innovation.

PEDAGOGICAL APPROACHES

Embracing New Pedagogical Paradigms

In the rapidly evolving logistics sector, integrating sustainability and innovation management into educational curriculums represents a pivotal shift in teaching methodologies. This approach not only aligns with global sustainability goals but also caters to the burgeoning demand for professionals who are adept at implementing cutting-edge, sustainable logistics solutions. By embedding these concepts as core pedagogical approaches, educational institutions can significantly enhance the relevance and impact of their logistics programs.

Core Components of the Approach

- **Sustainability in Logistics:** Educators are increasingly incorporating sustainability principles directly into logistics training, focusing on critical areas such as energy efficiency, waste reduction, and ethical supply chain management. This not only prepares students to meet regulatory requirements and environmental standards but also to drive sustainability initiatives within their future workplaces.
- **Innovation Management:** This component emphasises the adoption of digital tools and creative problem-solving techniques in logistics. Courses are designed to foster an innovative mindset, encouraging students to develop and implement solutions that enhance efficiency, reduce costs, and improve service quality in logistics operations.

Pedagogical Techniques

- **Case-Based Learning:** Utilising real-world cases to teach sustainability and innovation allows students to explore complex scenarios that mirror current industry challenges. This method enhances analytical skills and practical understanding, making the theoretical knowledge gained more applicable.
- **Problem-Based Learning:** This approach involves students working on real-world problems, where they identify solutions to sustainability and innovation challenges in logistics. By applying their knowledge in problem-solving contexts, students develop critical thinking skills and are encouraged to take initiative.
- **Collaborative Learning:** Encouraging teamwork on projects related to sustainability and innovation helps students learn from peers and develop skills necessary for multidisciplinary collaboration, which is essential in the diverse field of logistics.
- **Technology Integration:** Leveraging digital tools and simulation software to model operations and sustainability impacts. This exposure to technology prepares students for the digital nature of contemporary digital practices.

Outcomes and Impact

Adopting these pedagogical approaches leads to numerous benefits:

- **Enhanced Employability:** Graduates possess a robust set of skills that are highly valued in the logistics sector, making them well-prepared to tackle the challenges of modern supply chains.
- **Leadership in Sustainability:** Students emerge as champions of sustainability, ready to influence policies and practices within their organisations and the broader industry.
- **Innovation Leadership:** Equipped with skills in innovation management, graduates are prepared to lead change and drive technological advancements in logistics.

By incorporating sustainability-aware innovation management into logistics education, institutions are not only enhancing the learning experience but are also playing a crucial role in shaping the future of the logistics industry. This progressive educational approach ensures that the next generation of logistics professionals is well-prepared to lead with resilience, foresight, and a deep commitment to sustainable practices.

BRIDGING THEORY & PRACTICE

Enhancing Real-World Application

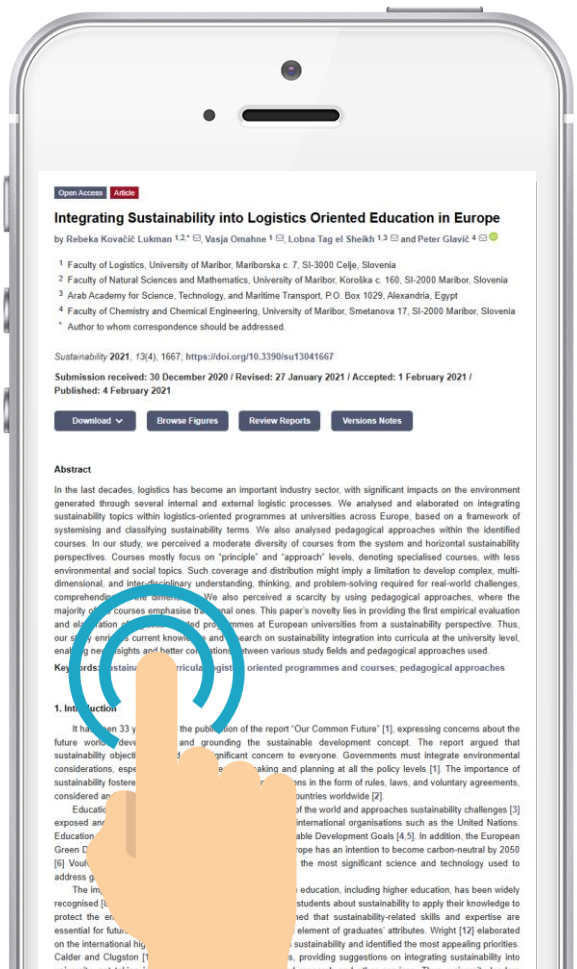
The integration of sustainability and innovation management into logistics education is pivotal, not just for enhancing theoretical knowledge but also for bridging the gap between classroom theory and practical application. This alignment offers substantial opportunities to cultivate a workforce equipped with the competencies necessary to drive sustainable and innovative solutions in the logistics sector.

Key Opportunities

- ❑ **Applied Learning:** Sustainability and innovation management courses designed with a strong emphasis on applied learning encourage students to undertake real-world projects and internships. These opportunities allow students to apply theoretical concepts in actual business contexts, enhancing their practical understanding and skills.
- ❑ **Technology Proficiency:** As logistics becomes increasingly reliant on digital solutions, integrating technology into education ensures that students are proficient with the latest digital tools. This prepares them to efficiently manage and optimize logistics operations using advanced software and platforms, bridging the gap between digital skills and industry requirements.
- ❑ **Problem Solving with Real Data:** Utilizing real-world data sets in case studies and simulations enables students to develop critical analytical skills. They learn to navigate complex sustainability and logistics challenges, making data-driven decisions that are crucial in modern logistics environments.
- ❑ **Sustainability Awareness:** Teaching the principles of sustainability alongside logistics management allows students to see firsthand how these practices can be implemented to solve contemporary challenges. This not only builds competence but also ingrains a strong sense of environmental stewardship and social responsibility.

Facilitating Theory-Practice Integration

- ❑ **Collaborations with Industry**: Partnerships with logistics companies provide students with exposure to current industry challenges and innovations. These collaborations can range from guest lectures and site visits to consultancy projects, where students propose solutions to real issues faced by companies.
- ❑ **Capstone Projects**: These projects are often the culmination of logistics programs, requiring students to integrate and apply their learning to develop comprehensive solutions for genuine logistical problems, often presented by partnering organizations.
- ❑ **Competitions and Hackathons**: Encouraging participation in industry-sponsored competitions or hackathons where students can innovate and solve real-time logistics problems helps bridge the theoretical knowledge with practical application while fostering a spirit of innovation.



Tap for more!

Business Case Studies Collection

The Business Case Studies Collection showcases how logistics companies are driving transformation through innovation management, digitalisation, and sustainability. By integrating advanced technologies, optimising processes, and fostering collaboration with customers, these companies are enhancing operational efficiency and meeting modern logistics demands. The case studies highlight how innovation management is key to achieving sustainability goals, improving service delivery, and reducing environmental impacts. These practices offer valuable insights for organisations seeking to implement effective innovation strategies and improve supply chain operations globally.

IMPLEMENTATION

This **Business Case Studies Collection** is a key resource within the EARTH project, highlighting innovative logistics practices from several European countries. It showcases case studies on the integration of digital tools and strategies to drive sustainability, offering actionable insights for embracing innovation in the logistics sector.

Key Insights from the Collection:

1 **Fostering Digitally-Facilitated Innovation Management:** The compendium highlights how logistics companies are adopting digital tools to drive innovation management. Emphasising technologies like AI and data analytics, companies are enhancing decision-making and optimising logistics processes. Companies such as Fiege Logistics Italia and Italtrans are using digital solutions to boost operational efficiency and foster continuous improvement.

2 **Digital Innovation in Logistics Management:** The focus is on strategically managing digital transformation. Logistics companies are using digital platforms to streamline operations, optimise workflows, and improve service delivery, demonstrating how innovation management can increase efficiency and customer satisfaction.

3 **Sustainability in Innovation Management:** Sustainability remains a key priority, with companies using digital tools to align operations with environmental goals. Integrating sustainability into innovation management helps meet regulations, reduce carbon footprints, and improve efficiency. Fiege and Torello Trasporti exemplify how digital platforms can track sustainability efforts.

4 **Customer-Driven Digital Innovation:** Collaboration with customers is crucial for driving digital innovation. Logistics companies are co-creating solutions with customers through digital platforms, ensuring services are both customer-centric and sustainable. Italtrans and Fiege focus on using digital tools to enhance supply chain performance.

5 **Workforce Engagement in Digital Transformation:** Investing in workforce skills is essential for successful digital innovation. Torello Trasporti's social inclusion and workforce development programmes demonstrate the importance of building digital literacy and innovation management skills within the sector.

6 **Shaping the Future of Logistics through Digital Innovation:** The case studies show that managing digital innovation will shape the future of logistics. Embracing technology to drive sustainability and customer satisfaction will lead to long-term success in the industry.

TAKE ADVANTAGE OF EARTH RESOURCES

The EARTH project is thrilled to unveil two further resources designed to empower educators, students, and logistics professionals with the tools to advance innovation management practices while aligning with the Sustainable Development Goals (SDGs) in logistics.

1. **Problem-Based Learning OERs:**
   The EARTH Problem-Based Learning (PBL) Open Educational Resources (OERs) will be a comprehensive set of multilingual, open-access materials published on our project website. These resources will provide engaging, hands-on learning opportunities for students to tackle real-world logistics challenges using innovation management frameworks aligned with the SDGs. The OERs will feature:
   - ❑ A **Teacher's Guide**, offering practical advice on using the materials effectively, selecting appropriate resources, and integrating innovation management and SDG-focused curricula.
   - ❑ **Ready-to-use Learning Activities**, including downloadable documents, worksheets, real-world scenarios, and multimedia materials. These activities will help students explore how digital tools can drive innovation in logistics while contributing to sustainable practices.

   By using PBL approaches, the OERs will empower educators to confidently integrate SDGs into innovation management teaching, equip students to apply these concepts in logistics, and foster stronger alignment of institutional curricula with industry needs and global sustainability frameworks.

2. **E-Benchmarking Platform**
   The EARTH E-Benchmarking Platform will provide a cutting-edge tool for logistics companies, educators, and students to evaluate and enhance their innovation management processes with a focus on the SDGs. The platform will include:
   - ❑ An **E-Benchmarking Survey**, designed to collect data on how logistics companies are digitally innovating and incorporating SDGs into their operations.
   - ❑ **General Results Description**, summarising logistics companies' inputs and offering insights into sector-wide trends and performance.
   - ❑ **Individualised Reports** that compare each company's innovation management practices against industry benchmarks, enabling companies to identify opportunities for improvement and optimise their SDG-driven innovation processes.

   The E-Benchmarking platform will help educators, students, and logistics professionals deepen their understanding of the relationship between SDGs and innovation management, motivating digital practices and fostering better integration of sustainable practices within logistics operations.

These two resources will serve as vital tools for advancing innovation in logistics, equipping stakeholders with the knowledge and strategies to enhance sustainability, drive digital transformation, and lead the way in innovation management within the logistics sector.

06

CONCLUSION

KEY TAKEAWAYS

As the logistics sector faces increasing pressure to integrate sustainability with innovation, this Guide outlines the essential strategies and tools needed to drive meaningful change. The following key takeaways highlight the critical factors for successfully aligning logistics operations with the SDGs while fostering a culture of innovation management and digital transformation. These elements are crucial for enhancing efficiency, driving sustainability, and staying competitive in an ever-evolving industry…

- ✓ **Digital Transformation is Key:** Embracing digital tools is essential for logistics companies to enhance efficiency, transparency, and sustainability, while also supporting SDG goals.
- ✓ **Aligning Education with Industry Needs:** Educational institutions play a critical role in preparing future logistics professionals. By aligning curricula with current and future industry needs, they help build a skilled workforce ready to tackle sustainability challenges.
- ✓ **Case Studies as Learning Tools:** Real-world case studies provide invaluable insights into how sustainability and innovation management can be integrated into logistics operations. These examples offer practical lessons and inspire other companies to adopt similar strategies.
- ✓ **Collaboration is Crucial:** Achieving sustainability goals in logistics requires collaboration across all sectors, including businesses, education providers, and policymakers. The integration of new technologies and sustainable practices demands continuous improvement and shared efforts.
- ✓ **Driving Positive Change:** This Guide emphasises that logistics operators and professionals must lead the charge in adopting sustainable practices. By integrating innovation management and digital solutions, they can transform challenges into growth opportunities and contribute to a more sustainable and equitable future.

ADVANCING INNOVATION MANAGEMENT AND SUSTAINABILITY IN LOGISTICS

In conclusion, this Guide provides the foundational knowledge and resources necessary for integrating sustainability and innovation management within logistics operations. By embracing digitalisation, fostering collaboration, and aligning practices with the SDGs, logistics companies can drive operational efficiency and contribute to global sustainability efforts. The strategies and tools presented in this guide are designed to equip educators, students, and industry professionals with the insights needed to lead the sector towards a more sustainable and innovative future.

07

ANNEXES

GLOSSARY OF TERMS

1. Sustainability: The practice of operating without depleting natural resources or causing harmful environmental impacts, ensuring that future generations can meet their needs.

2. Innovation Management: The process of managing an organization's innovation procedure, which includes creating new ideas, products, or methodologies, and implementing them to enhance the organization's objectives.

3. Sustainable Development Goals (SDGs): A collection of 17 global goals set by the United Nations General Assembly in 2015, intended to be achieved by the year 2030, focusing on social inclusion, environmental sustainability, and economic development.

4. Logistics: The detailed organization and implementation of a complex operation, often related to the transportation, warehousing, and distribution of goods.

5. Green Logistics: Logistics strategies and operations that minimize environmental impact and promote sustainability through practices like recycling, using fuel-efficient vehicles, and reducing waste.

6. Digital Transformation: The integration of digital technology into all areas of a business, fundamentally changing how the business operates and delivers value to customers.

7. Benchmarking: The practice of comparing business processes and performance metrics to industry bests and best practices from other companies.

8. Open Educational Resources (OERs): Freely accessible, openly licensed text, media, and other digital assets that are useful for teaching, learning, and assessing as well as for research purposes.

9. Pedagogy: The method and practice of teaching, especially as an academic subject or theoretical concept.

10. Curriculum Alignment: The process of adjusting the teaching materials and assessments to ensure they meet the learning goals and standards set by educational authorities or institutions.

11. Capstone Projects: Projects that are conducted by students towards the end of their academic path that incorporate the knowledge, skills, and competencies acquired throughout their academic program.

12. Stakeholders: Individuals or groups that have an interest in any decision or activity of an organization, which includes employees, clients, suppliers, and the community where the business operates.

13. Real-Time Data: Information that is delivered immediately after collection, with no delay in the timeliness of the information provided.

14. Adaptive Learning: An educational method that uses technology to adapt the learning content and experience according to students' learning needs, as indicated by their responses to questions and tasks.

15. Industry Insights: Valuable information derived from the analysis of industry activities that can inform decision-making processes and strategic planning.

16. Environmental Stewardship: The responsible use and protection of the natural environment through conservation and sustainable practices.

17. Circular Economy: An economic system aimed at eliminating waste and the continual use of resources. Circular systems employ reuse, sharing, repair, refurbishment, remanufacturing, and recycling to create a closed-loop system.

18. Supply Chain Management (SCM): The oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. SCM involves coordinating and integrating these flows both within and among companies.

19. Corporate Social Responsibility (CSR): A business model that helps a company be socially accountable—to itself, its stakeholders, and the public. By practicing corporate social responsibility, companies can be conscious of the kind of impact they are having on all aspects of society.

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