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AI Core Curriculum for Micro, Small and Medium-sized Enterprises in Retail

INcreasing the uptake of AI in Retail

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AI Core Curriculum for MSMEs in Retail

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INTRODUCTION

In a time when artificial intelligence (AI) and digital transformation are profoundly reshaping industries, the retail sector is confronted with unique and pressing challenges. The European Union's Digital Decade strategy[1], which sets the ambitious goal of achieving 75% AI adoption among EU companies by 2030, highlights the critical need for businesses - particularly micro, small, and medium-sized enterprises (MSMEs) - to embrace AI-driven solutions. However, the adoption of AI in the retail sector remains strikingly low, with only 6.7% of enterprises having implemented AI technologies.[2]

This publication, developed in the scope of the "INcreasing the uptake of AI in Retail" (INAIR) project, funded by the European Union's Horizon Europe programme, is intended to address this adoption gap by providing an AI Core Curriculum designed to equip European retailers with the necessary skills to effectively leverage AI technologies for optimising resources and processes and greening their companies.

Built on the results of transnational research work[3], the curriculum focuses on the development of transversal, digital, and green skills, aligned with the *European Skills, Competences, Qualifications and Occupations* (ESCO) classification[4]. It also covers a wide range of technical AI competences, from foundational knowledge of AI, machine learning and natural language processing to advanced data processing, visualisation, ethics and regulatory compliance.

To ensure inclusivity and adaptability, the curriculum adopts a modular, proficiency-based learning approach. It is structured around three distinct proficiency levels - Foundation, Intermediate, and Advanced - enabling learners to build their skills progressively. Each learning block is designed to address the varying needs and knowledge levels of retail professionals, fostering a comprehensive understanding of AI and its applications.

By adopting this tailored approach, the curriculum seeks to empower retail MSMEs with the essential skills required to responsibly implement AI solutions. This is expected not only to enhance their operational efficiency and sustainability but also enable them to remain competitive within Europe's rapidly evolving digital landscape.

[1] European Commission. (n.d.). Europe's digital decade. https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade
[2] Eurostat (2024). *Artificial intelligence by NACE Rev.2 activity*. Online data code: isoc_eb_ain2. DOI: 10.2908/isoc_eb_ain2. Data for 2023. Accessed on 13/11/2024.
[3] Włoch, R., Ślosarski, B., Paliński, M., Śledziewska, K., Teodorowicz, K., & Łebkowska, W. (2024). AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania. Zenodo. https://doi.org/10.5281/zenodo.12793437
[4] ESCO. (n.d.). The ESCO classification. https://esco.ec.europa.eu/en/classification

1. Project Overview

The "INcreasing the uptake of AI in Retail" (INAIR) project aims to **contribute to reducing the AI skills gap of European micro, small and medium-sized retailers**, to let them exploit the potential of AI for greening their businesses and support their competitiveness in the global market. The project is executed by a consortium of international partners:

- Lascò Srl - Project Coordinator
- University of Warsaw - Digital Economy Lab
- University of Cyprus - Software Engineering Lab
- Italian Chamber of Commerce for Germany (ITKAM)
- TEAM4Excellence
- BSD Design Studio

To address the AI skills gap in Europe's retail sector, the INAIR project delivers **key resources to support MSMEs in adopting AI effectively and sustainably**.

1 RESEARCH ON AI SKILL NEEDS

An in-depth analysis identifying multi-level AI skills needs and gaps for retail MSMEs across Europe[5], to inform curriculum development. Through desk research and co-creation workshops with relevant industry experts, led by the Digital Economy Lab of the University of Warsaw, the consortium analysed in the countries involved the gaps in two key areas: ESCO's transversal, information and digital skills needed to adopt AI, and sector-specific technical skills needed to adopt AI.

2 AI CORE CURRICULUM FOR MSMES IN RETAIL

A comprehensive, modular curriculum to address fundamentals of AI and its applications for greening retailers and supporting them in optimising resources and processes. Co-created with educators and industry experts, the curriculum is structured across foundational, intermediate, and advanced proficiency levels and includes sixteen learning blocks to support retailers to adopt AI to make their companies, processes and products more sustainable.

[5] Włoch, R., Ślosarski, B., Paliński, M., Śledziewska, K., Teodorowicz, K., & Łebkowska, W. (2024). AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania. Zenodo. https://doi.org/10.5281/zenodo.12793437

3 OPEN EDUCATIONAL RESOURCES

A suite of interactive and multilingual learning resources, including modules, simulations, and quizzes. These resources make AI training accessible in multiple languages and formats, supporting diverse learning needs across participating countries.

4 E-LEARNING PLATFORM

An intuitive digital learning environment that hosts the curriculum and OERs, allowing participants to engage in flexible, self-paced learning. This platform offers user-friendly navigation and tailored learning pathways, optimising the AI learning experience for retail MSMEs.

Through its targeted deliverables, the INAIR project addresses critical AI competency gaps within the retail MSME sector. By delivering a structured, accessible, and industry-relevant AI curriculum, the project aims to facilitate sustainable digital transformation across European retail. The initiative is designed to equip retail MSMEs with the essential technical and transversal skills required to integrate AI effectively into their operations, thereby **enhancing productivity, sustainability and competitiveness within the digital economy**.

2. Methodological Approach

2.1 Development of AI Core Curriculum for MSMEs in Retail

2.1.1 Scope

The AI Core Curriculum provides a structured educational pathway for owners and employees of micro, small and medium-sized retailers to empower them to make data-driven, efficient decisions across essential functions, including marketing, e-commerce, product management and other critical business areas.

It comprises learning units, referred to as "learning blocks," distributed across three proficiency levels - Foundational, Intermediate, and Advanced. Each proficiency level contains a minimum of five learning blocks, ensuring a comprehensive and scalable learning experience. An integrated Assessment Tool complements the curriculum, which evaluates competences associated with the core AI principles and their application in retail MSMEs, aimed at promoting sustainable business practices (commonly referred to as "greening").

Key Focus Areas

The AI Core Curriculum is centred on two main areas of development:

- **Transversal skills and competencies, and information and digital skills** needed to adopt AI and green competences to use AI to make their companies, processes and products more sustainable;
- **Technical skills** to adopt AI, including (a) high-level knowledge of AI, Machine Learning and Natural language processing, (b) awareness and understanding of AI, its implications and societal impacts, (c) data processing, visualisation and management, (d) knowledge representation and reasoning, planning, search, optimisation, (e) multi-agent systems, and (f) AI regulation, ethics, philosophy and trustworthiness.

The curriculum **consists of 16 distinct learning blocks** across 3 levels of difficulty, each focusing on a critical domain of AI applications in retail:

- Foundational level:
  - Learning Block 1. Introduction to AI
  - Learning Block 2. Basic operational dynamics of AI
  - Learning Block 3. Applications of Artificial Intelligence in Retail
  - Learning Block 4. Data-driven decision making
  - Learning Block 5. Ethics

- Intermediate level:
    - Learning Block 6. Machine Learning in Retail
    - Learning Block 7. Natural Language Processing (NLP) in Retail
    - Learning Block 8. Driving Human-Centred Innovation with AI
    - Learning Block 9. AI for Sustainability
    - Learning Block 10. Regulations and Trustworthy
- Advanced level:
    - Learning Block 11. AI-Enabled Value Chain
    - Learning Block 12. AI for Knowledge and Insights Management
    - Learning Block 13. AI for Operations Optimization
    - Learning Block 14. AI-powered Customer Engagement
    - Learning Block 15. AI for Inventory Management
    - Learning Block 16. AI-driven Business Intelligence

Fractal Educational Model

The curriculum adopts a **fractal educational model**[6], structured around four core components to ensure flexibility, adaptability, and learner engagement:

CONCEPT-BASED CURRICULUM DESIGN

The curriculum is underpinned by a set of key concepts and fundamental principles of AI applications. These principles are tailored to the unique needs of retailers, with an emphasis on productivity enhancement and greening processes.

HEUTAGOGY

The curriculum promotes autonomy and self-directed learning, enabling learners to explore materials at their own pace. Opportunities are provided for learners to set goals, reflect on their progress, and take ownership of their educational journey.

LEARNER-CENTRED TEACHING

Active engagement is prioritised through hands-on exercises and real-world applications, enabling learners to apply theoretical knowledge in practical retail scenarios. The curriculum also offers personalised learning paths, allowing learners to select blocks that align with their skill levels, interests, and professional needs.

OPENNESS

Deliverable in open educational environments, the curriculum aims to provide flexibility by offering unrestricted access to resources and study materials, free from temporal, geographical, or organisational limitations. This design encourages attitudes of self-learning and self-responsibility.

[6] Enriquez L. (2017). Fractal: An educational model for the convergence of formal and non-formal education. Open Praxis, Vol. 9, No. 4, Oct-Dec 2017: 375-386.

Structure of Learning Blocks

The learning blocks were designed around the findings and conclusions of the multi-level AI skills needs analysis and were inspired by the Concept-Based Curriculum Model developed by Erickson et al.[7]. Each block contains the following elements:

- **Block title**: A concise representation of the critical content addressed.
- **Block overview**: A summary of the block's content and learning objectives.
- **Generalisations (Conceptual Understandings)**: Broad conceptual insights that learners are expected to grasp.
- **Guiding questions**: A mix of factual, conceptual, and debatable questions to promote inquiry and deeper understanding.
- **Learning outcomes**: defined statements describing what learners are expected to know, understand and be able to do upon completing the learning block, formulated according to the Bloom's Taxonomy[8].
- **Key skills**: Skills that learners should acquire, based on findings from transnational research and aligned with ESCO classification.
- **Critical content**: Essential information learners need to ground their conceptual understanding.
- **Suggested learning experiences**: Practical examples of pedagogical methods and effective learning activities.
- **Assessment methods**: Tools to evaluate understanding of conceptual insights, critical content, and acquired skills.

Data Sources for Learning Block Components

The below data sources were identified for each component of the blocks.

Figure 1. Data Sources for Learning Blocks' Components

Block's Component	Data Source(s)
Block Title	The block title should succinctly summarise the critical content addressed within the block.
Block Overview	N/A - Summary of the block
Generalisations	Generalisations (or "conceptual understandings") that learners are expected to develop through the curriculum. These are refined based on the findings from the curriculum research and aligned with key learning objectives.
Guiding questions	INAIR's transnational research *"AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania"*. These questions are

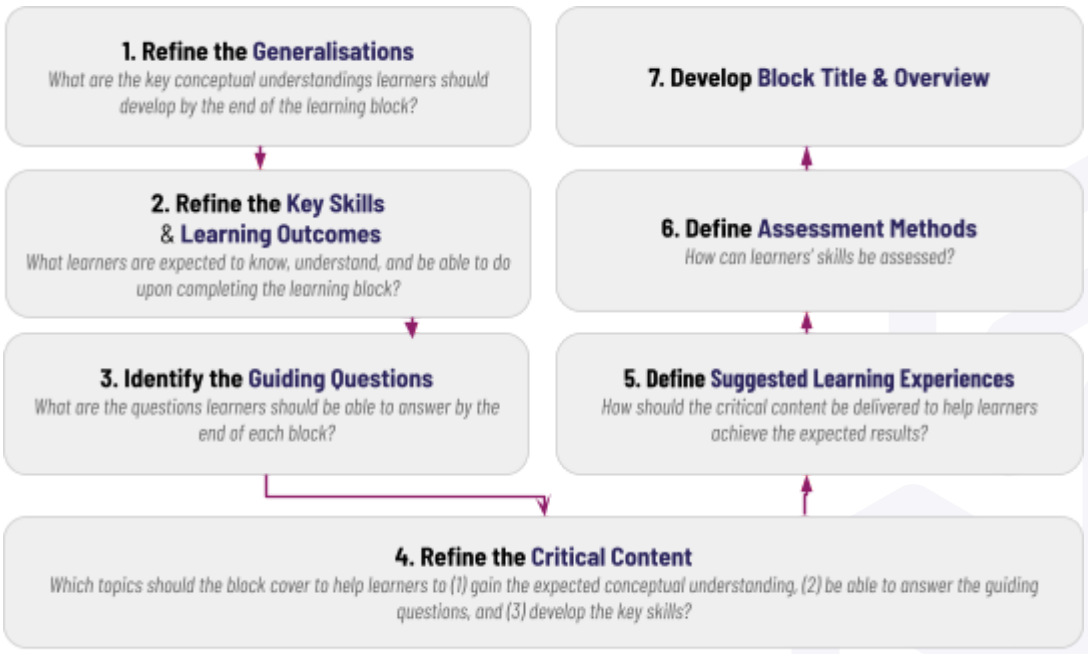
[7] Erickson H.L., Lanning L.A. & French R. (2017). Concept-Based Curriculum and Instruction for the Thinking Classroom, 2nd Edition, Corwin. ISBN: 9781506355399.
[8] Shabatura, J. (2022). *Using Bloom's Taxonomy to Write Effective Learning Outcomes*. Available at: https://tips.uark.edu/using-blooms-taxonomy/#gsc.tab=0

Block's Component	Data Source(s)
	designed to encourage learners to actively explore and develop conceptual understanding. Guiding questions should shape the learning experience, model inquiry, and engage learners as active participants.
Learning outcomes & Key skills	▪ Findings of INAIR's transnational research; ▪ ESCO for the formulation of the skills in compliance with the European classification.
Critical content	▪ Findings of INAIR's transnational research; ▪ Analysis of existing curricula and courses; ▪ Experience and expertise of the partners' researchers.
Suggested learning experiences	▪ Experience and expertise of the partners' researchers and instructional designers; ▪ Analysis of existing curricula and courses conducted by the consortium.
Assessment methods	Experience and expertise of the partners' researchers and instructional designers.

2.1.2 Development Flow

The following figure summarises the development flow adopted by the consortium to create the blocks.

Figure 2. Learning Blocks' Development Flow



2.2 Instructional Design

Instructional design provides a systematic approach for creating effective, learner-centred educational experiences. Building on the INAIR curriculum, instructional designers can ensure that each learning block is tailored to achieve specific learning objectives, aligning with the practical needs of the target group. The *ADDIE framework* (Analysis, Design, Development, Implementation, Evaluation) can provide a comprehensive and iterative approach to course development. This framework ensures that every phase of the process - from identifying learners' needs and defining objectives to designing learning experiences - is guided by evidence-based practices.

2.2.1 Analysis

Instructional designers should begin by analysing the specific needs of their target audience and the context in which the courses will be delivered. Key considerations include:

Understanding skill gaps: Review the findings from the "AI Skills Needs and Gaps for MSMEs in the Retail Sector [...]" report to identify critical skill gaps in AI adoption within the retail industry.

Customising for audience needs: Determine whether learners require foundational knowledge (e.g., understanding AI concepts) or advanced competencies (e.g., applying AI insights to decision-making).

Contextual factors: Consider the organisational constraints, such as time availability, access to technology, and preferred learning formats (e.g., online, hybrid, or in-person).

This phase helps instructional designers identify how the curriculum's content can be adapted to meet specific learner and organisational needs.

2.2.2 Design

The design phase focuses on structuring learning blocks into complete, learner-centred courses.

Generalisations

Each of the sixteen learning blocks is structured around conceptual generalisations. These generalisations form the backbone of the curriculum by unifying diverse topics and ensuring learners develop transferable skills applicable across various contexts. The following generalisations provides the foundation for the curriculum:

AI has the potential to redefine the way businesses conceptualise value creation, innovation, and operational strategy in the evolving digital economy.	AI's influence on human systems requires businesses to adapt to shifting relationships between technology, people and markets.
AI systems are designed to mimic and extend aspects of human cognition, enabling machines to process information, reason, and make autonomous decisions in complex environments.	AI's application across the retail value chain can enable a fundamental rethinking of processes, enhancing not just efficiency but also creating opportunities for customer-centric innovation and value delivery.
The capacity to govern, manage and use data is critical for organisations to drive evidence-based decision-making.	Data-driven insights enable businesses to make informed decisions and anticipate trends.
An efficient data infrastructure is essential for collecting and analysing reliable data to support AI-driven decision-making.	AI systems raise important ethical considerations, and addressing them is essential to ensure technology benefits society and builds trust.
AI-driven systems learn from and adapt to patterns, enabling organisations to deliver more personalised and efficient experiences.	AI-driven natural communication systems enhance interaction and understanding between businesses and customers.
AI-driven innovation that centres on human needs and values fosters sustainable, customer-focused growth.	AI systems can have both positive and negative impacts on the environment, depending on how they are designed, implemented, and used.
AI can support sustainable practices by optimising resource use and balancing business growth with environmental responsibility.	Trustworthy AI is rooted in ethical frameworks and regulatory standards that ensure fair and transparent use of technology.
AI can act as a connective force that aligns and optimises processes across various parts of the business ecosystem.	AI integration throughout the value chain can drive efficiency, sustainability, and competitive advantage.

Automation enables optimised workflows, improving supply chain operations, resource management, and cost control.	AI's ability to generate, store, and process insights can strengthen organisational intelligence, driving better decisions and foresight.
Machine learning and deep learning enable the analysis of large, complex datasets to identify trends, patterns, and anomalies, which would be difficult to track manually, improving both real-time decision-making and long-term strategies.	AI systems can facilitate knowledge sharing and collaboration by managing vast amounts of structured and unstructured data, allowing businesses to create a more agile, data-driven culture.
AI technologies can be effectively applied to enhance efficiency in production, logistics, and resource management, directly reducing operational costs.	Data-driven insights generated by AI tools empower managers to make informed decisions that drive strategic change and operational improvements.
Implementation of AI requires not only technical skills but also interpersonal and self-leadership skills, including managing change and fostering innovation.	AI systems can deepen understanding of human behaviours, allowing organisations to foster meaningful, personalised engagement.
AI-driven systems can help align supply and demand through intelligent forecasting and dynamic resource management.	AI-enhanced decision-making tools can generate actionable insights to support strategic foresight and proactive business leadership.

These generalisations serve as the foundation for the curriculum, providing instructional designers a backbone of the curriculum, helping to organise and connect diverse Learning Blocks topics into a coherent framework, ensuring that learners see the curriculum as a unified whole rather than a collection of isolated subjects. Moreover, the generalisations promote understanding of broad, transferable concepts that learners can apply across different scenarios, roles and challenges. In addition, the generalisations help instructional designers craft assessments that evaluate learners' understanding of core principles rather than rote memorisation.

Key Skills

The key skills targeted in the curriculum are categorised into foundational skills (e.g., data handling) and advanced skills (e.g., decision-making with AI insights). This categorisation provides a clear progression for learners as they move through the blocks, ensuring a structured and logical approach to skill development. Each block, therefore, is not treated as an isolated unit but as part of a cohesive learning journey. Early blocks introduce essential concepts, such as basic AI dynamics, while later blocks delve into specialised applications, such as natural language processing in customer service. This progression allows learners to build a comprehensive and interconnected understanding of AI in retail, equipping them with the skills necessary to innovate and make data-driven decisions in their future roles.

Selecting Instructional Strategies

A variety of instructional strategies can be used to ensure learners can engage with the content effectively, retain knowledge and apply it to real-world retail scenarios. This step determines how learners will interact with the content, make sense of complex AI concepts and apply these ideas to real-world scenarios. The identified strategies includes the following:

- **Active Learning:** Activities like case studies, group discussions, and simulations encouraged learners to interact with the material actively.

  For example, in the "Machine Learning in Retail" block, learners can analyse customer datasets, apply clustering algorithms and interpret patterns for strategy development.

- **Experiential Learning:** Real-world, problem-based activities simulated the challenges learners would face in retail settings.

  For example, in the "AI for Inventory Management" block, learners can forecast stock needs using machine learning models.

- **Scaffolded Learning:** Scaffolded learning refers to designing activities that build from simple to complex, allowing learners to acquire foundational knowledge before tackling more advanced applications.

  For example, introducing basic AI concepts in early blocks and gradually integrating complex retail scenarios in later blocks.

- **Reflection and Critical Thinking:** Learning blocks include opportunities for reflection and critical thinking.

  For example, encouraging self-reflection through journals, discussion boards, and peer review, or using case analyses, debates and problem-solving scenarios that prompt learners to think critically.

Resource Selection

Resource selection ensures that learners have access to relevant, high-quality materials that support their understanding and skill development. Selecting appropriate resources - such as articles, videos, AI tools, and case studies - enhances the depth and relevance of the learning experience. At this stage, instructional designers:

- **Gather and curate relevant content**, such as articles, videos, tools, and software specific to AI in retail to support learning goals. For example, resources on AI-driven demand forecasting, customer engagement tools, or business intelligence dashboards provide practical insights into AI applications.

- **Include diverse formats** - such as infographics, video lectures, and interactive modules - to address varied learning preferences and enhance comprehension.
- For hands-on activities, **identify industry-relevant AI tools** (e.g., recommendation engines or NLP software) that learners can use. This prepares learners for the tools they'll likely encounter in a retail setting, helping them build applicable skills.

Assessment Activities

Designing assessment activities is essential because assessments not only evaluate learner progress but also reinforce key concepts, ensuring that knowledge is retained and skills are effectively developed. Learners need to demonstrate not only theoretical understanding, but practical application. Formative and summative assessments are both important components in instructional design as they serve distinct yet complementary roles in supporting and evaluating learner progress. Formative assessments are conducted throughout the learning process and offer continuous feedback, allowing learners to gauge their understanding and make adjustments as they progress. Summative assessments occur at the end of a learning block or course and evaluate learners' overall mastery of the material. These high-stakes assessments provide a comprehensive measure of learners' skills and knowledge, indicating their readiness to apply AI concepts to real-world retail challenges. By designing varied assessment activities learners have multiple ways to demonstrate and practise what they have learned. For example:

- Multiple-choice and true/false *quizzes* are ideal for assessing foundational knowledge on topics like AI concepts, ethics, or basic operational dynamics.
- *Short-answer questions* encourage learners to articulate key concepts, such as describing a specific AI application in retail or explaining the importance of ethical AI practices.
- *Real-world case studies* present learners with a retail-focused case study where AI is used (e.g., customer segmentation, personalised marketing). Instructors can ask them to analyse the case, identify the AI techniques applied, and evaluate its effectiveness.
- *Hands-On Tool* practice assignments give learners access to AI tools or software relevant to retail (like sentiment analysis or recommendation systems) and assign tasks that require them to use these tools. For example, they could create a basic model for customer segmentation.
- *Hands-On data* analysis projects. With this method, the instructor provides retail datasets and asks learners to conduct analyses using machine learning or data visualisation tools, then present their findings.
- *Project-based assessments* can be assigned at the end of key blocks where learners apply the concepts they've learned. For example, after a block on "AI for Customer Engagement," learners could develop a mock strategy for enhancing customer experience using AI.
- A *capstone project* is appropriate for a summative assessment, where learners can develop a comprehensive AI-driven solution for a retail scenario. This project can involve multiple steps, such as analysing customer needs, proposing an AI solution, and presenting its projected impact.
- *Concept mapping* gives learners the chance to create concept maps linking different AI concepts within the retail domain, illustrating their understanding of connections and dependencies between topics.
- *Problem-solving exercises* can pose real-world retail challenges, such as optimising product placement with AI insights or improving customer retention. Learners propose AI-driven solutions,

demonstrating practical application skills.

- Current *events analysis* can be used to assign recent news articles about AI in retail and ask learners to analyse the scenario, predicting potential outcomes or improvements.

2.2.3 Development

The Development phase of the ADDIE model is where instructional materials, activities and resources are created based on the design blueprint. This phase is about turning the AI Core Curriculum instructional plan into tangible, learner-centred content and tools that will facilitate effective learning. In this phase, instructional designers work closely with subject matter experts, multimedia developers and other stakeholders to ensure each element aligns with the course objectives and is engaging, accessible, and impactful for learners.

2.2.4 Implementation

The implementation phase involves delivering the developed curriculum to learners in a structured and accessible manner, ensuring that instructional design plans and objectives are effectively put into practice. For the AI in retail curriculum, implementation can take place through a blended approach, combining online learning modules, in-person workshops, and interactive simulations tailored to retail scenarios.

The implementation methods outlined below serve as examples to illustrate how the core curriculum could be delivered effectively. At this current stage of core curriculum design, it is essential to establish a clear understanding of the potential delivery methods, even though specific instructional tactics may evolve later. Recognising these implementation possibilities informs the design of the curriculum by aligning learning objectives, content structure, and instructional strategies with how the course might ultimately reach learners. This foresight ensures that each learning block is constructed with an end-to-end learning journey in mind, facilitating both knowledge acquisition and practical skill development.

- Blended learning can be used for foundational blocks delivered through self-paced online modules, accessible on an LMS (Learning Management System). These modules provide video lectures, readings, and quizzes, allowing learners to build essential AI knowledge.
- For hands-on skills, such as data-driven decision-making, in-person or virtual workshops can be held, enabling learners to practise with real retail datasets and tools.
- For technology and tool Integration, learners can access these tools via cloud-based platforms or downloadable software, giving them practical experience with industry-standard technology.
- Online synchronous classes for simulations or case-based projects can be implemented to mimic customer interactions, helping learners apply AI concepts in realistic retail scenarios.
- During implementation, instructors and facilitators play a crucial role in guiding learners, answering questions, and providing feedback on assessments.

2.2.5 Evaluation

Evaluation is an ongoing component, allowing for continuous improvement based on learner feedback and outcomes, thereby ensuring the curriculum remains relevant and effective in preparing learners for the evolving landscape of AI in retail.

3. Ethical Considerations

The integration of ethical considerations is a core component of the AI Core Curriculum, reflecting AI's significant impact on privacy, human autonomy, and fairness. The curriculum is designed to address ethical challenges associated with AI technologies, with a focus on transparency, accountability, and human-centred practices, following the European Commission's *Ethics Guidelines for Trustworthy AI*[9] as well as the *Ethical Guidelines on the Use of Artificial Intelligence and Data in Teaching and Learning for Educators*[10]. By aligning with these guidelines, the curriculum ensures that ethical considerations are embedded throughout every stage of AI use, from data handling to automated decision-making.

This chapter provides detailed guidance for teachers on how to address AI in educational contexts, in order to empower educators to promote responsible AI usage.

3.1 Ethical Use of AI in Teaching

Teaching about AI within the AI Core Curriculum involves equipping learners with the knowledge, skills and ethical mindset necessary to critically understand, evaluate and responsibly engage with AI technologies. Drawing on the *Ethical Guidelines on the Use of Artificial Intelligence and Data in Teaching and Learning for Educators,* this section provides a set of ethical guidelines to support educators in promoting responsible AI use as a subject while fostering awareness of its implications for society.

Core Principles for Ethical AI Education

To integrate ethics into AI education effectively, educators should focus on the following principles:

- **Human Agency and Autonomy**: Encourage learners to critically examine AI's role in decision-making processes and its impact on human autonomy. Highlight the importance of human oversight and the risks of over-reliance on automated systems.
- **Fairness and Inclusivity**: Ensure that learners understand how bias in AI systems can exacerbate existing inequalities and discuss strategies to design and implement equitable AI systems.
- **Transparency and Accountability**: Teach learners to value explainability and accountability in AI systems, including how algorithms operate and their impact on individuals and society.
- **Environmental and Societal Well-being**: Highlight AI's potential environmental impact and discuss its implications for sustainability and societal progress.
- **Privacy and Data Governance**: Emphasize the importance of ethical data use, privacy protection, and compliance with regulations like the GDPR.

[9] European Commission: Directorate-General for Communications Networks, Content and Technology (2019). *Ethics guidelines for trustworthy AI*. Publications Office, https://data.europa.eu/doi/10.2759/346720
[10] European Commission: Directorate-General for Education, Youth, Sport and Culture (2022). Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators. Publications Office of the European Union, https://data.europa.eu/doi/10.2766/153756

Guidelines for Ethical AI Curriculum Delivery

Educators play a critical role in equipping learners with the knowledge and skills to critically evaluate AI's multi-dimensional impacts and to engage responsibly with its opportunities and challenges. In delivering the curriculum, educators should **frame AI not merely as a set of technological tools but as a transformative force that intersects with human, social and organisational dimensions**. This involves fostering a **multidisciplinary approach**, encouraging learners to draw on insights from fields such as philosophy, sociology, environmental science and law to engage with AI critically and comprehensively. Through this approach, learners can understand the broader ethical, legal, and societal contexts that shape and are shaped by AI technologies.

Educators should also **promote reflective learning as part of ethical AI education**. This involves creating opportunities for learners to examine their values, assumptions and responses to ethical dilemmas involving AI. Reflection enables learners to articulate their perspectives on the societal impacts of AI and to consider the implications of ethical decision-making in real-world contexts. By encouraging this introspection, educators can help learners develop a more nuanced and empathetic understanding of AI's role in society.

To assess learners' understanding of the ethical dimensions of AI, educators should design activities that go beyond factual recall to **evaluate critical reasoning, ethical analysis and practical application**. For example, learners could be tasked with analysing case studies of AI deployment to identify ethical challenges and propose solutions. Similarly, scenario-based assessments can help learners explore complex ethical dilemmas, encouraging them to weigh competing values and articulate well-reasoned approaches to addressing them.

Guiding Questions for Educators Delivering the AI Core Curriculum

When teaching AI as part of the AI Core Curriculum, educators should consider the ethical, societal, and pedagogical dimensions of the subject. While a comprehensive legal or ethical assessment may be beyond the scope of a single educator's role, these guiding questions are tailored to help educators reflect on their teaching practices, align with ethical standards and promote responsible engagement with AI topics.

The following guiding questions can help educators structure their teaching practices in ways that encourage critical reflection, promote ethical reasoning and align with the principles of trustworthy AI.

1. Human Agency and Oversight

- How is the educator's role positioned in ensuring learners critically evaluate AI's influence on decision-making, human autonomy and fairness?
- Are learners encouraged to consider the balance between human oversight and automated decision-making in various AI applications?
- Do lesson plans allow space for learners to discuss and question potential anomalies, biases, or discriminatory outcomes in AI systems?
- How are learners equipped to understand the societal implications of overreliance on AI-driven processes and systems?

- Are learners guided to reflect on the role of empathy, judgment and human intuition in decision-making processes that might otherwise be influenced by AI?

2. Transparency

- Are learners taught to critically evaluate the methods and processes underlying AI systems, including the data and algorithms used?
- How does the curriculum enable learners to understand which aspects of decision-making AI can automate and where human intervention remains essential?
- Are learners encouraged to explore how AI systems arrive at their conclusions, particularly in areas such as personalisation, assessment, or recommendation engines?
- How do learning activities address the reliability and limitations of AI systems in achieving their intended outcomes?
- Is information about AI systems presented in a way that is accessible, clear and comprehensible to all learners, regardless of their prior knowledge?

3. Diversity, Non-Discrimination, and Fairness

- How does the curriculum help learners understand the potential for bias in AI systems and its impact on different communities or individuals?
- Are learners encouraged to consider how AI systems can perpetuate or mitigate inequality, including for individuals with disabilities or special education needs?
- Do learning scenarios demonstrate how biased training data can affect AI outputs, and are learners encouraged to propose solutions for addressing such biases?
- How does the curriculum guide learners to explore the ethical implications of designing AI systems that adapt respectfully to individual needs while maintaining fairness?
- Are learners prompted to consider the importance of inclusive design practices in the development and deployment of AI technologies?

4. Societal and Environmental Wellbeing

- How are learners encouraged to evaluate the broader societal impacts of AI, including its effects on emotional wellbeing, interpersonal relationships and societal norms of end-users?
- Are learners prompted to reflect on the environmental costs of AI, such as the energy demands of data centres and to consider sustainable alternatives?
- How does the curriculum address the importance of maintaining clarity about AI's simulated social interactions and its inability to experience emotions or empathy?
- Are learners guided to explore scenarios in which AI systems may inadvertently cause harm or fear and to propose ways to mitigate these risks?
- How does the curriculum encourage learners to think about balancing innovation with societal responsibility and wellbeing?

5. Privacy and Data Governance

- How does the curriculum teach learners about the ethical management of sensitive data, including

the principles of anonymity, limited access, and secure storage?
- Are learners equipped to understand the implications of data collection and usage in AI systems, including compliance with data protection laws such as the GDPR?
- Are learners guided to reflect on the trade-offs between data-driven innovation and privacy concerns?
- Does the curriculum include activities that explore transparency in data usage, informing learners about how their data might be used in AI systems and for what purposes?
- Are learners prompted to evaluate mechanisms for customising privacy settings in AI systems and to advocate for their rights in data governance?

6. Technical Robustness and Safety

- How are learners guided to assess the reliability and technical robustness of AI systems, including safeguards against errors and data breaches?
- Does the curriculum include opportunities for learners to explore mechanisms for testing and validating AI systems to ensure they meet intended goals and applications?
- Are learners encouraged to think critically about oversight mechanisms for AI, including data collection, processing, and minimisation practices?
- How does the curriculum foster confidence among learners in evaluating the safety of AI systems and proposing improvements to address potential risks?

7. Accountability

- Are learners taught to consider who holds responsibility for monitoring and evaluating AI systems and their societal impact?
- How does the curriculum prompt learners to explore accountability frameworks, including the role of ethics in decision-making and AI governance?
- Are learners guided to reflect on the responsibilities of individuals, organisations, and governments in ensuring that AI systems align with educational and societal values?
- Does the curriculum include case studies or scenarios where learners assess accountability in AI system design, deployment, and oversight?

3.2 Trustworthy AI Assessment

Instructors and learners are encouraged to use the *Assessment List for Trustworthy AI* (ALTAI) framework developed by the High-Level Expert Group on Artificial Intelligence (AI HLEG), set up by the European Commission[11] to evaluate AI systems across critical ethical dimensions. ALTAI provides a structured approach for assessing the trustworthiness of AI tools, offering targeted questions aligned with the seven key requirements of Trustworthy AI. This framework serves as a valuable resource for ensuring ethical considerations are addressed in the tools and technologies explored in the course. The targeted questions are aligned with the seven key requirements of Trustworthy AI:

[11] European Commission: Directorate-General for Communications Networks, Content and Technology, The Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self assessment, Publications Office, 2020, https://data.europa.eu/doi/10.2759/002360

1. **Human Agency and Oversight**: Trainers should guide learners to consider how human oversight can be maintained across AI systems, especially in automated retail functions. Scenarios can be used to illustrate the balance between AI autonomy and human control.
2. **Technical Robustness and Safety**: Educators should discuss the importance of developing reliable and resilient AI systems. Exercises that assess system vulnerabilities help learners understand the importance of robustness in maintaining trust.
3. **Privacy and Data Governance**: Given the importance of privacy in retail, trainers should cover responsible data collection, storage, and usage. Encourage learners to critically evaluate data governance practices, particularly those related to customer data.
4. **Transparency**: Educators should emphasise the role of transparency in fostering trust. Demonstrate how to explain AI processes in lay terms, so customers and stakeholders can understand AI-driven decisions.
5. **Diversity, Non-Discrimination, and Fairness**: Trainers should use examples that illustrate how bias can emerge in AI applications. Discussions on how to audit and address these biases are essential for ethical AI deployment in diverse customer settings.
6. **Societal and Environmental Wellbeing**: Introduce learners to the societal impacts of AI, including both positive outcomes like resource efficiency and potential downsides, such as job displacement. Scenarios can help learners think through these broader impacts.
7. **Accountability**: Reinforce the importance of accountability frameworks. Discuss the need for clear lines of responsibility when deploying AI, especially in scenarios where systems impact customer choices or access to services.

3.3 Foundational Ethics for Learners

To engage responsibly with AI, learners in the AI Core Curriculum must acquire a solid grounding in ethical principles guiding AI use. In alignment with UNESCO's *Recommendation on the Ethics of Artificial Intelligence*, this curriculum encourages learners to understand and uphold key ethical values, including respect for privacy, fairness, transparency, and accountability. These principles are essential to ensuring that AI development and application safeguard human dignity while promoting inclusivity and sustainability.

This document includes two dedicated learning blocks - **Ethics** and **Regulations and Trustworthy AI**. These blocks are designed to equip learners with critical skills to assess AI tools through an ethical lens, focusing on core principles such as transparency, accountability, and respect for privacy.

Ethics block covers the importance of transparent AI systems and stresses the need for accountability in AI-generated outcomes, helping learners understand how ethical AI can prevent unintended harm, support human autonomy, and promote societal well-being.

Regulations and Trustworthy AI block introduces learners to essential EU regulations, including the **General Data Protection Regulation (GDPR)**, the **EU Artificial Intelligence Act**, and Ethics guidelines for Trustworthy AI, which provide a legal framework for responsible AI deployment. Through this component, learners gain foundational knowledge of compliance standards for privacy, data protection, and ethical AI

practices, guiding them to interpret and apply these regulations in real-world scenarios.

Educators are encouraged to present these ethical principles as integral to responsible AI use, framing ethics as a core competency. By doing so, teachers can help students internalise the importance of these principles in real-world applications, preparing them to implement AI solutions that are both effective and ethically sound within the retail sector.

4. Learning Blocks

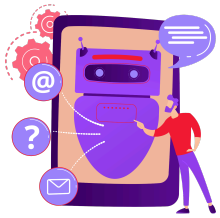
The AI Core Curriculum for MSMEs in Retail is organised into **16 learning blocks**, structured to guide learners progressively across three levels of competence - Foundation, Intermediate, and Advanced.

Each learning block is designed with a consistent framework to provide a comprehensive understanding of AI applications in retail. The blocks are structured to include the following components:

- Block title
- Block overview
- Generalisations
- Guiding questions
- Learning outcomes
- Key skills
- Critical content
- Suggested learning experiences, differentiated per synchronous learning scenarios (instructor-led, online or face-to-face) and asynchronous (self-administered, online or blended)
- Assessment methods

This structure ensures that learners can build upon foundational knowledge, advance through intermediate topics, and ultimately achieve proficiency in more complex AI applications tailored for the retail sector.

Learning Block 1. Introduction to AI



This learning block explores the fundamentals of artificial intelligence and its impact on retail business models, consumer behaviours, jobs, and skills. It focuses on modern digital technologies such as AI, Big Data, IoT, and cloud computing, while building skills in statistics, data visualisation, and understanding rule-based and self-learning algorithms like ML and DL. Emphasising practical competencies like prompt creation and ethical awareness, this block equips learners with the tools and mindset to use AI responsibly and confidently to address business challenges.

Generalisations

- AI has the potential to redefine the way businesses conceptualise value creation, innovation, and operational strategy in the evolving digital economy.
- AI's influence on human systems requires businesses to adapt to shifting relationships between technology, people and markets.

Guiding Questions

- What are the applications of AI in retail?
- How does AI impact business operations in retail?
- What are the ethical concerns associated with AI, and how can they be addressed?
- Should there be stricter regulations to govern AI's ethical applications in business?

Learning Outcomes

LO1	Define foundational concepts of AI, including machine learning, deep learning, and neural networks.
LO2	Explain the differences between rule-based and self-learning algorithms and their applications.
LO3	Use generative AI technology and basic data visualisation tools (e.g., line charts, histograms) to present and interpret AI-generated insights.
LO4	Identify patterns and trends in data using statistical measures like mean, median, and standard deviation.
LO5	Assess the ethical implications and risks of AI, including issues like algorithmic bias and data privacy.

LO6	Create prompts to find reliable practical applications of AI tools for specific business challenges in retail operations.

Key Skills

Digital (Cognitive and digital skills)

- Basic knowledge of modern digital technologies: AI, Big Data, IoT, i cloud computing.
- Basics of statistics: Learning key statistical concepts such as mean, median, mode, variance, standard deviation and their application in data analysis.
- Basic data visualisation: Understanding basic data visualisation tools (e.g. line charts, histograms, bar charts) and their use to present analysis results.
- Understanding the operation and differences between rule-based and self-learning algorithms (ML, DL, LLM). Learning the principles of operation, possibilities and limitations of artificial intelligence.
- Creating and using prompts: Ability to use generative AI technology (e.g. in chatbots).
- Understanding the risks associated with the use of AI: Basic awareness of potential risks from AI, e.g. data security.

Mindset (Interpersonal and related skills self-entrepreneurship)

- Openness to cooperation with new technologies: Initiative in recognizing problems and finding solutions using AI.
- Independence and self-confidence in using AI tools: Building confidence in using new technologies in everyday tasks.
- Ethics and transparency in the use of AI: Understanding the importance of responsibility for the use of AI, compliance with personal data protection regulations. (M)

Critical Contents

1. Fundamentals of Artificial Intelligence
   This section introduces the foundational concepts and key components of artificial intelligence, covering topics such as machine learning, deep learning, and neural networks. Learners will study the distinctions between AI types, including rule-based and self-learning algorithms, to understand how AI systems function. By grasping these basics, learners gain insights into AI's principles and potential applications in various sectors, laying the groundwork for more advanced AI concepts and practical applications.

2. Statistics and Data Visualization
   This section covers essential statistical concepts, such as measures of central tendency (mean, median, mode) and variability (standard deviation), which are crucial for interpreting data in AI contexts. Learners will also explore data visualisation tools, including line charts, histograms, and

scatter plots, to effectively present and analyse data trends. By mastering these skills, learners can better understand and communicate insights drawn from AI-generated data, making data interpretation accessible and impactful.

3. Computational Aspects of AI and Algorithms

   This section focuses on understanding the practical use of advanced algorithms in AI, including machine learning (ML), deep learning (DL), and large language models (LLMs). Learners will explore how these algorithms are applied to process data, recognize patterns, and generate insights across diverse business scenarios. Key algorithmic concepts—such as clustering for segmentation, neural networks for complex data processing, and transformer models in LLMs for language understanding—are discussed in terms of their real-world applications rather than technical fundamentals. Learners will gain knowledge of how these algorithms contribute to AI-driven decision-making and enhance operational processes, preparing them to leverage computational tools effectively in AI applications.

4. AI in Daily Life and Industry Applications

   This section provides an overview of real-world applications of AI across daily life and industry, illustrating how AI enhances user experiences and operational efficiencies. Learners will examine common AI applications like voice assistants, image recognition, and recommendation systems, as well as industry-specific uses in sectors such as healthcare, finance, and retail. By understanding these applications, learners gain a clear perspective on AI's practical benefits and limitations in various contexts.

5. AI's Impact on Company Processes

   This section explores AI's transformative impact on specific business processes, highlighting how AI-driven tools streamline and automate tasks across various functions. Learners will examine applications such as chatbots that enhance customer service by handling routine inquiries efficiently and predictive analytics that optimise supply chain management by forecasting demand and managing inventory in real-time. Through case studies, learners will gain insights into how AI reimagines traditional workflows, enabling greater operational efficiency, improved customer satisfaction, and data-driven decision-making. This process-focused approach equips learners to understand and apply AI tools that enhance productivity and adaptability within business operations.

6. Risks Associated with AI

   This section addresses the risks inherent in AI use, focusing on data privacy, algorithmic bias, and security vulnerabilities. Learners will explore the ethical and practical concerns associated with deploying AI technologies, emphasising the importance of transparency and responsible AI practices. Discussions on data misuse and bias in AI systems help learners understand the precautions necessary for safe AI integration, promoting an awareness of responsible AI implementation in diverse settings.

Suggested Learning Experiences

- **Interactive Lectures and Discussions:** An instructor-led lecture covering the foundational concepts of artificial intelligence, including machine learning, deep learning, and neural networks. Include clear examples to illustrate distinctions between rule-based AI and self-learning algorithms (like recommendation engines or chatbots). Incorporate open discussions where learners can share their observations of AI in everyday use, particularly in retail, to connect theory with real-world applications.

  Example: After discussing machine learning, the instructor might explain how retailers use ML to recommend products based on purchase history, prompting a discussion on how this shapes consumer behaviour and sales.

- **Case Study Exploration: AI in Retail:** Assign groups to analyse real-world case studies where AI has been applied in the retail industry, such as demand forecasting, inventory optimization, or personalised marketing. Following case study reviews, groups discuss the practical advantages and limitations of AI, with insights on how similar solutions could benefit other retailers.

  Example: A group might analyse a case study on a retailer's use of AI-powered recommendations, explaining how these algorithms improve customer engagement. They then suggest how smaller retailers could adopt similar AI-driven personalization tools to enhance the shopping experience.

- **Hands-On Practice with AI Tools:** Provide access to beginner-friendly AI platforms, such as Google Colab, OpenAI's Playground, or platforms like ChatGPT, where learners can experiment with algorithms and prompt-based generative AI tools. Through guided exercises, learners practise with simple clustering algorithms for customer segmentation and work with prompt-based tools to generate text responses for customer support or content creation. This hands-on practice helps learners understand how these tools support business decision-making and customer interaction.

  Example: Learners work on designing prompts to address common customer inquiries, such as "How do I return a product?" or "What are today's promotions?" They experiment with different prompt structures to guide ChatGPT in generating clear, helpful responses. Next, they create a prompt to segment customers by interests or past purchasing behaviours and use ChatGPT to recommend relevant products. By fine-tuning prompts, learners observe how precise language improves response quality, gaining insights into prompt-based AI applications that enhance customer interactions and support business processes.

Assessment Methods

- **Prompt Creation Exercise and Self-Assessment:** Learners complete a practical exercise where they design prompts for ChatGPT to answer common customer service questions and perform customer segmentation. They submit a portfolio of prompts and generated responses, accompanied by a self-assessment reflecting on prompt effectiveness and potential improvements.

  Example: Learners create prompts like "What are the store hours?" and "What's the return policy?" and adjust their wording to achieve clear, relevant answers. They then write a brief self-assessment noting which prompts worked best and any adjustments they would make to improve response accuracy.

Learning Block 2. Basic operational dynamics of AI

This learning block explores the basic operational dynamics of artificial intelligence, focusing on the fundamentals of Machine Learning and Natural Language Processing, and their role in automating and optimising business processes. It focuses on developing digital skills to understand AI's impact on operations, use basic AI tools effectively in everyday operations.

Generalisations

- AI systems are designed to mimic and extend aspects of human cognition, enabling machines to process information, reason, and make autonomous decisions in complex environments.

Guiding Questions

- What are the basic components of machine learning and natural language processing?
- How does AI enable operational optimization in business settings?
- What is the role of AI tools in enhancing routine business processes?

Learning Outcomes

LO1	Identify key concepts of artificial intelligence, including Machine Learning, Natural Language Processing, and computer vision.
LO2	Explain the basic operational dynamics of AI and its role in automating business processes.
LO3	Use AI tools to perform simple tasks such as categorising data, extracting insights from text, or automating repetitive operations.
LO4	Analyse practical applications of NLP and computer vision in everyday business operations, such as data analysis or text recognition.
LO5	Evaluate the benefits and challenges of integrating AI into routine operations, including potential impacts on workflows and collaboration.
LO6	Create a simple workflow using basic AI tools, such as automating data entry or categorising customer inquiries, to demonstrate an understanding of AI's role in streamlining routine operational tasks.

Key Skills

Digital (Cognitive and digital skills)

- Understanding the operational dynamics of AI: Understanding how AI affects the automation and optimization of business processes.
- Knowledge of basic AI tools : Ability to use AI-based tools (platforms, applications) in everyday operations.

Mindset (Interpersonal and Self-Leadership Skills)

- Openness to innovation and organisational changes: Acceptance and curiosity for the introduction of new technologies and organisational changes resulting from the use of AI.
- Ability to quickly adapt to technological changes: A proactive approach to learning new AI tools and digital skills (E)
- Collaboration with technology teams: Ability to effectively communicate and cooperate with IT and data analytics departments (M)

Critical Contents

1. AI and Machine Learning. Core Concepts and ML Models

   This section provides an introduction to essential AI and machine learning concepts, focusing on foundational models and their practical applications. Learners will explore core types of machine learning: supervised learning (using labelled data to train models), unsupervised learning (finding patterns in unlabeled data), and reinforcement learning (training models through trial and error). Key algorithms such as decision trees (for classification and decision-making), clustering (for grouping similar data points), and regression models (for predicting continuous outcomes) are presented with real-world examples. Emphasis is placed on understanding how these models process data and provide actionable insights, supporting automation and data-driven decision-making across business processes. This approach equips learners with a foundational understanding of ML models, preparing them to apply these concepts to enhance efficiency and decision-making in practical settings.

2. Natural Language Processing and Generative AI

   This section introduces Natural Language Processing (NLP) and generative AI, focusing on their capabilities to understand, interpret, and generate human language. Learners will explore key NLP applications, including sentiment analysis (identifying emotions in text), language translation (converting text between languages), and chatbots (automating conversational interactions). Additionally, the section covers generative models that create new content, such as text generation for automated writing and image synthesis for visual content creation. Through practical examples, learners will see how these technologies enhance customer service, streamline internal and external communication, and support content creation within organisations, providing valuable tools to improve engagement and operational efficiency. This approach equips learners with a

foundational understanding of NLP and generative AI, preparing them to leverage these technologies in real-world applications.

3. Computer Vision
   This section covers computer vision, focusing on how AI systems interpret and analyze visual data. Learners will examine applications like object detection, image recognition, and facial recognition, which are used in sectors such as retail, healthcare, and security. Through case studies, learners will see how computer vision transforms workflows by automating tasks like quality inspection, security monitoring, and inventory management, enabling businesses to leverage visual data effectively.

4. AI Tools in Everyday Operations
   This section focuses on the operational role of AI tools in streamlining daily business workflows and enhancing productivity. Learners will examine how AI-driven tools optimise routine tasks by automating repetitive processes, reducing manual effort, and increasing speed across functions. Predictive analytics tools will be explored for their capacity to improve operational forecasting, supporting data-driven planning and resource allocation. This prepares learners to implement AI tools that integrate seamlessly into business workflows, driving efficiency and consistency in day-to-day operations.

5. AI Impact on Business and Operating Models
   This section examines how AI influences and transforms traditional business and operating models, driving new strategies for growth, efficiency, and customer engagement. Learners will study how AI integration changes organisational structures and shifts business models towards data-driven approaches. The section highlights AI's impact on decision-making, customer personalization, and operational agility, helping learners understand the strategic importance of adapting business models to leverage AI fully.

6. Systems, Processes, and Roles to Build an AI-Powered Organisation
   This section covers the essential systems, processes, and roles necessary for establishing an AI-driven organisation. Learners will explore the infrastructure needed to support AI, including data management, model deployment, and integration processes. The section also addresses the roles of key personnel, such as data scientists, AI engineers, and IT support, who collaborate to create an AI-enabled environment. Learners will gain insights into the organisational changes and strategic planning required to embed AI into the company's core processes effectively.

Suggested Learning Experiences

- **Hands-On Workshop: Introduction to Natural Language Processing for Business Applications:** In this workshop, learners will explore basic NLP techniques, including text classification, sentiment analysis, and keyword extraction, to understand how AI processes and interprets human language in a business context. Using beginner-friendly tools like ChatGPT or Hugging Face's transformers library on Google Colab, learners will practise applying NLP models to sample customer feedback

data. The goal is to show how NLP can enhance customer insights, automate support tasks, and improve customer satisfaction.

Example: Learners work with a text classification model to automatically categorise customer support inquiries into topics such as "Returns," "Shipping," or "Product Information." By inputting various sample inquiries, they see how the model groups similar questions, which can then be routed to the appropriate support team. This exercise illustrates how NLP can streamline customer service workflows, ensuring faster response times and more efficient handling of customer needs.

- **Case Study Analysis: Natural Language Processing and AI in Customer Service:** Learners will examine case studies focusing on Natural Language Processing (NLP) and its use in enhancing customer service, such as chatbots and sentiment analysis. These case studies illustrate how NLP-driven tools streamline interactions, reduce response times, and interpret customer feedback to improve satisfaction and engagement.

  Example: One case study could focus on a retail company's use of chatbots to manage customer inquiries. Learners would analyse how the chatbot understands and responds to questions, considering how this tool supports efficiency by handling high volumes of customer requests. The exercise shows NLP's operational value and impact on customer service processes.

- **Scenario-Based Exercises on Adapting to AI-Driven Changes:** This exercise uses scenarios where learners consider how to adapt to new AI tools in a workplace setting. Scenarios include AI-driven changes in tasks like inventory management or customer service automation. Learners discuss potential challenges and advantages of adopting AI, and reflect on how they would support a team during technological changes.

  Example: In one scenario, learners consider a retail setting where an AI tool is implemented for inventory forecasting. They discuss how this impacts roles and tasks in inventory management, identifying strategies to support the team in adapting to the new system. This helps learners develop a positive mindset for change, an essential skill in AI-driven environments.

Assessment Methods

- **Quiz on Core AI Concepts and Applications:** A quiz evaluates learners' foundational understanding of machine learning and natural language processing concepts. Questions cover definitions, types of machine learning (supervised, unsupervised), and practical applications of AI in business.

  Example: Questions might include identifying scenarios where clustering would be beneficial or choosing between supervised and unsupervised learning for specific data types. Short-answer questions could ask learners to explain how NLP enhances customer service.

- **Scenario-Based Assessment on AI Implementation in Business Processes:** Learners are presented with scenarios where a business applies AI tools and machine learning models to improve operations. Each scenario involves a specific AI approach, such as using supervised learning for customer segmentation, NLP for customer support, or computer vision for quality inspection.

Learners respond with simple, practical steps for implementing the AI model and explain its benefits and any potential challenges.

Example 1: A retail business wants to segment customers based on purchase behaviour. Learners outline steps to use supervised learning (e.g., decision trees) for customer segmentation, explaining how the model could help target marketing efforts more effectively. They also identify potential challenges, like data quality and the need for training.

Example 2: In a manufacturing scenario, learners explore how computer vision could automate quality inspection. They suggest basic steps for integrating an object detection model and discuss how it would reduce human error and increase efficiency, addressing potential challenges like setup costs and system maintenance.

Learning Block 3. Applications of Artificial Intelligence in Retail

Practical ways AI is used across the retail value chain. This includes personalising customer experiences, optimising inventory and supply chains, and improving overall efficiency. Real-world examples will show how AI is transforming retail to better meet customer needs and boost business success.

Generalisations

- AI's application across the retail value chain can enable a fundamental rethinking of processes, enhancing not just efficiency but also creating opportunities for customer-centric innovation and value delivery.

Guiding Questions

- Which are the best application cases of AI in retail as of now?
- In what ways can AI personalise customer experiences in retail and optimise inventory management and supply chain operations to improve retail efficiency?
- What practical examples demonstrate how AI is transforming retail businesses to better meet customer needs and achieve business success?

Learning Outcomes

LO1	Identify examples of how AI is used in retail, such as personalising customer experiences and managing inventory.
LO2	Explain how AI technologies enhance efficiency, improve customer satisfaction, and transform retail operations.
LO3	Use AI tools to explore customer data and identify patterns or trends in simulated retail scenarios.
LO4	Analyse real-world examples of AI applications in retail, identifying opportunities and challenges for implementing AI-driven solutions.
LO5	Evaluate the effectiveness of AI tools in improving retail operations, such as customer engagement, inventory management, and pricing optimisation, and propose actionable improvements.

LO6	Develop a simple plan for using AI tools, such as a recommendation system or pricing optimisation tool, to address retail operations.

Key Skills

Digital (Cognitive and digital skills)

- Knowledge of AI applications in retail: Understanding how AI impacts marketing, sales and customer service in the retail industry.
- Ability to identify AI technologies useful in a business context: Assessing which AI technologies can bring real benefits to specific retail businesses.
- Understanding AI use cases in retail: Illustrating real benefits and scenarios of using AI in retail.

Mindset (Interpersonal and Self-Leadership Skills)

- Understand the value of data as a strategic asset: The ability to collect, analyse and use data to make decisions.
- Boldly taking risks and introducing innovations: Initiating changes and introducing innovative solutions based on AI.
- Development of communication skills with the team: Ability to effectively present predictive analytics results and AI-based recommendations to other team members.

Critical Contents

1. Machine Learning in Retail: Practical Uses
   This section shows how machine learning can revolutionise retail by learning from diverse data sources such as customer behaviour, sales patterns, inventory levels, and supply chain metrics. It explains how machine learning models use this data to personalise customer experiences, predict demand, and optimise operations. Practical use cases demonstrate how retailers use these models to adapt to market trends and improve decision-making. The section also highlights the importance of clean, well-structured data and the strategic value of continuous learning for maximising the impact of machine learning in retail.

2. Predictive Analysis and Customer Behaviour: Practical Uses
   This section highlights the impact of the previously described machine learning on predictive analysis of customer behaviour, emphasising the advantages of using AI to forecast demand more accurately. AI enables retailers to segment customer personas effectively and create tailored content for each group. Thanks to these insights, businesses can refine personalization strategies, boost customer engagement, and optimise inventory management.

3. Pricing Optimization
   This section focuses on the benefits of using AI in pricing optimization, which involves controlling

machine learning algorithms to analyse factors like customer demand, competitor pricing, and market conditions in real-time. AI can dynamically adjust prices to maximise revenue and profit margins while maintaining customer satisfaction. By continuously learning from data, AI ensures prices are competitive and aligned with consumer preferences. This approach allows retailers to optimise pricing strategies and respond quickly to market changes.

4. Supply Chain Optimization

   This section highlights how supply chain optimization with AI works by using machine learning algorithms to predict demand, streamline inventory management, and improve logistics efficiency. AI analyses data from various sources to identify patterns and optimise routes, reducing costs and improving delivery times. By continuously learning from real-time data, AI helps businesses minimise waste and ensure a smoother, more responsive supply chain. This leads to better resource allocation, reduced stockouts, and improved customer satisfaction.

5. AI-Driven Personalization in Retail

   This section covers how AI-driven personalization in retail uses customer data, such as browsing behaviour, purchase history, and preferences, to deliver tailored shopping experiences. For example, AI can recommend products based on past purchases, offer personalised discounts, or create dynamic website content suited to individual tastes. Retailers like Amazon and Netflix utilise AI to personalise product recommendations and content, enhancing customer engagement. This level of customization helps build loyalty and increase conversion rates by presenting customers with more relevant options.

Suggested Learning Experiences

- **Theoretical Exploration of the Application of Machine Learning in Retail:** This experience's aim is to understand the underlying principles of the application of machine learning in retail. Learners will engage in a lecture or seminar that covers the foundational concepts of machine learning and its specific role in retail. This theoretical session will include discussions on supervised and unsupervised learning models, predictive analytics, and the importance of clean, structured data for effective model training.

  Example: Theories will be linked to real-world retail scenarios, such as how a fashion retailer uses machine learning to predict trends based on customer behaviour, inventory levels, and sales patterns.

- **Hands-On Predictive Analysis Project:** This approach aims at applying predictive analysis to customer behavior using AI tools. Learners will work with AI-driven platforms (such as Google Cloud AI or Microsoft Azure) to create customer segmentation models based on historical purchasing data. They will analyse patterns and develop predictive models to forecast demand and segment customers into distinct personas.

Example: Learners will simulate a retail business (e.g., an online store) and use machine learning algorithms to predict which products will be in high demand during a seasonal sale, adjusting inventory and marketing strategies accordingly.

- **AI-Driven Personalization Strategy Workshop:** This workshop covers the design of an AI-driven personalization strategy to enhance customer engagement. Learners will participate in a workshop where they use real customer data (anonymized) to create personalised marketing strategies and product recommendations for an e-commerce platform. They will apply techniques like collaborative filtering or content-based filtering to personalise offers and content dynamically.

  Example: A practical task could involve designing a personalised shopping experience for a customer segment, such as recommending specific clothing items based on past purchase history or personalising home page content to increase conversion rates for returning customers.

Assessment Methods

- **Project-Based Assessment: AI-Driven Retail Strategy:** This assessment method requires learners to apply all the learned concepts from machine learning, predictive analysis, pricing optimization, supply chain optimization, and AI-driven personalization to develop a comprehensive AI strategy for a retail business. The project will be a combination of both theoretical insights and practical applications.

  Example: Learners will be assigned the task of designing an AI-powered retail strategy for an e-commerce company. The project will include:

  - Customer Behaviour Analysis: Using machine learning to segment customers and predict their future purchasing behaviour.
  - Personalization Strategy: Proposing personalised marketing campaigns based on customer data, including product recommendations and personalised offers.
  - Pricing Optimization: Implementing dynamic pricing algorithms that adjust prices based on demand, competitor pricing, and market conditions.
  - Supply Chain Optimization: Creating an AI-driven solution to optimise inventory levels and improve logistics efficiency.

  The final deliverable will include a written report, an AI strategy presentation, and a demonstration (e.g., a working model or dashboard) that highlights how each AI component (personalization, pricing, supply chain) is applied in the retail strategy.

- **Case Study Analysis and Report:** In this assessment, learners will analyse a real-world retail case study where AI is used in various aspects, including predictive analysis, pricing optimization, and

supply chain management. They will be required to critique the effectiveness of these AI applications and suggest improvements based on their learnings.

Example: Learners will receive a case study of a major retailer (e.g., Amazon or Walmart) that uses AI to enhance customer experience, optimise pricing, and streamline supply chains. The assessment will involve:

- Case Study Review: learners will evaluate how the retailer uses machine learning to predict customer demand, personalise offerings, and adjust pricing strategies.
- Critical Analysis: Students will identify potential weaknesses or areas where AI implementation could be improved. For example, they may suggest ways to enhance the predictive model used for inventory optimization or explore alternative pricing algorithms.
- Recommendation Report: Students will write a report detailing their analysis, improvements, and the potential impact of their recommendations on the retailer's business outcomes.

Learning Block 4. Data-driven decision making

This learning block covers the fundamentals of data-driven decision-making, including pre-processing, interpreting, and validating AI-generated data. It focuses on descriptive statistics, data infrastructure, predictive analytics, and AI recommendation systems, equipping learners to optimise decision-making processes and adapt to market trends.

Generalisations

- The capacity to govern, manage and use data is critical for organisations to drive evidence-based decision-making.
- Data-driven insights enable businesses to make informed decisions and anticipate trends.
- An efficient data infrastructure is essential for collecting and analysing reliable data to support AI-driven decision-making.

Guiding Questions

- How does data contribute to informed business decision-making?
- In what ways can AI assist in data processing, analysis, and interpretation?
- Are predictive analytics tools always reliable in business forecasting?
- What are the applications and limitations of predictive analytics in business?

Learning Outcomes

LO1	Identify key concepts of descriptive statistics, data analysis, and predictive analysis, including measures of central tendency, data variability, and forecasting methods.
LO2	Explain how data infrastructure and AI tools contribute to collecting, analysing, and interpreting data to support business decision-making.
LO3	Use AI-driven analytics platforms to pre-process, analyse, and interpret datasets to optimise business decisions.
LO4	Analyse AI-generated outputs, such as recommendations or predictive analytics, to identify patterns, trends that inform business decisions.
LO5	Evaluate the outcomes of AI-based analytics tools applied to sales data, identifying patterns and discussing its potential impact on improving business decisions.

LO6	Create a basic workflow using AI tools, such as a predictive model, to address a common business scenario like customer segmentation or sales forecasting.

Key Skills

Digital (Cognitive and digital skills)

- Basics of descriptive statistics: Ability to calculate basic measures of central tendency for data sets. Understand the variability and distribution of values within a data set, as well as the relationships between variables to assess connections within the data.
- Understanding data infrastructure: Ability to work with data, collect, analyse and process it using AI tools.
- Pre-processing, interpretation and verification of data generated by AI: The ability to correctly interpret data obtained through AI to make better decisions.
- Predictive analysis: Using AI to analyse data to predict market trends and optimise business decisions.

Mindset (Interpersonal and Self-Leadership Skills)

- Critical thinking and problem solving: Ability to reason logically and structurally solve data-driven problems.
- Independence in making decisions based on data: The ability to make decisions based on data analysis and artificial intelligence, without the need for external support (M)

Critical Contents

1. Introduction to Descriptive Statistics

   This section introduces foundational statistical concepts essential for summarising and interpreting data, such as measures of central tendency (mean, median, mode) and dispersion (range, variance, standard deviation). Learners will gain skills in interpreting data patterns and trends, forming a basis for informed data analysis. Understanding these basic statistics is crucial for analysing data outputs from AI tools and supporting data-driven decision-making within business contexts.

2. Data Management Using AI Tools

   This section covers effective data management practices using AI-powered tools, focusing on data collection, organisation, and storage. Learners will explore tools and techniques for handling large datasets, ensuring data quality, and making data accessible for analysis. Emphasis is placed on how AI tools streamline data management processes, from cleaning and structuring data to integrating various data sources, which is essential for accurate analysis and reliable AI-generated insights.

3. Data Analysis and Interpretation Using AI

   This section delves into the use of AI tools for data analysis and interpretation. Learners will practise analysing datasets using AI-driven analytics platforms, exploring foundational techniques such as pattern recognition, basic trend analysis and data visualisation. Through practical exercises, learners will learn to interpret AI-generated insights, transforming raw data into actionable information that supports decision-making.

4. Predictive Analytics

   This section delves into the technical foundations of predictive analytics, illustrating how AI leverages historical data to forecast future trends and outcomes. Learners will study core models such as regression analysis (for identifying relationships between variables) and time-series forecasting (for predicting values based on past patterns), along with an introduction to techniques like classification and clustering for segment-based predictions. Practical applications are included to demonstrate how these models are used to anticipate demand, personalise customer experiences, optimise inventory, and respond to potential market shifts. By mastering these predictive techniques, learners will gain the technical skills to make data-driven forecasts that support proactive, strategic decision-making and resource optimization across business functions.

5. AI Recommendation Systems for Better Decision-Making

   This section examines AI-powered recommendation systems and their role in supporting business decisions. Learners will explore how recommendation algorithms analyse user behaviour and preferences to suggest products, services, or actions that align with customer needs and business goals. Practical examples include personalised product recommendations, content curation, and targeted marketing, illustrating how recommendation systems enhance customer experience and drive business growth by providing relevant, data-backed insights.

Suggested Learning Experiences

- **Practical Application of Data Analysis and Interpretation Using AI:** In this hands-on activity, learners work with AI-driven analytics platforms to analyse datasets, using techniques like visualizing data patterns or categorizing data based on predefined attributes to understand customer behaviours. By simplifying the analysis process through these ready-made features, learners can focus on interpreting AI-generated insights and transforming raw data into useful information to improve decision-making.

  Example: Using Tableau or Power BI, learners categorise customers based on purchase frequency (e.g., frequent buyers, seasonal shoppers) using built-in tools and visualisations. This activity helps learners understand how data analysis supports targeted marketing, product recommendations, and better customer engagement.

- **Scenario-Based Exercises in Data-Driven Decision-Making:** Through real-world scenarios, learners practise making business decisions based on AI-generated insights. Each scenario presents a dataset and a business challenge (e.g., forecasting demand, segmenting customers, or optimising

inventory), requiring learners to analyse the data and decide on an optimal course of action. This exercise builds critical thinking and independent decision-making skills, reinforcing the importance of data-driven approaches in business.

Example: Learners are given a scenario where they manage inventory for a seasonal product. They use predictive analytics to estimate demand and adjust stock levels accordingly, discussing the potential risks and benefits of relying on AI-generated forecasts for decision-making. This scenario helps them evaluate data accuracy, timing, and the decision-making process.

- **Exploration of AI Recommendation Systems Through Case Studies:** Learners will explore case studies focused on AI-powered recommendation systems, such as product recommendations or content curation. The case studies demonstrate how recommendation algorithms analyse data to suggest relevant options aligned with customer preferences. Learners discuss the impact of these systems on customer experience and business outcomes, with examples that illustrate recommendation systems' role in personalising interactions and driving engagement.

  Example: A case study might examine a streaming service's recommendation algorithm, which suggests movies and shows based on viewing history. Learners analyse how this personalization increases user satisfaction and engagement, considering how similar recommendation systems might enhance decision-making in areas like e-commerce or retail.

Assessment Methods

- **Predictive Model Simulation and Reflection:** Learners participate in a simulation where they use a prebuilt predictive model to forecast future trends based on historical data. They input their own datasets into the model and explore how it functions, examining the generated predictions and insights. After the simulation, learners discuss the model's potential impact on decision-making.

  Example: Using a prebuilt time-series forecasting model, learners input past sales data to predict future demand. They explore how the model generates predictions and, in their reflection, discuss how these forecasts could aid inventory planning and consider potential limitations, such as seasonality or unexpected market changes.

- **Multiple-Choice and Short Answer Quiz on Statistics and Data Visualization:** Learners complete a quiz covering the basics of descriptive statistics, data analysis, interpretation, and visualization concepts discussed in the course. Questions focus on understanding basic visualization types (e.g., histograms, line charts) to ensure foundational knowledge of data analysis and interpretation.

  Example: A question might present a histogram showing sales data across different product categories and ask learners to identify the category with the highest sales.

Learning Block 5. Ethics

This learning block examines the ethical considerations associated with Artificial Intelligence, with a focus on the principles of transparency, accountability, and fairness in AI-generated outcomes and decisions. It addresses critical issues such as bias, privacy, and data protection, highlighting the importance of responsible AI deployment and adherence to ethical guidelines.

Generalisations

- AI systems raise important ethical considerations, and addressing them is essential to ensure technology benefits society and builds trust.

Guiding Questions

- What are the key ethical concerns when implementing AI technologies, and how can they impact decision-making?
- Why is transparency important in AI systems, and how can organisations ensure that AI-generated outcomes are explainable?
- How can businesses ensure accountability in AI systems and mitigate risks related to bias, discrimination, or privacy violations?

Learning Outcomes

LO1	Identify key ethical principles in AI, such as fairness, transparency, accountability, and privacy protection.
LO2	Explain the impact of ethical concerns, such as bias, discrimination, and data privacy violations, on AI-driven decision-making.
LO3	Use ethical frameworks to assess and address risks in AI deployment, such as mitigating biases in algorithms or ensuring transparency in decision-making processes.
LO4	Analyse real-world examples of ethical dilemmas in AI, identifying root causes and proposing strategies for responsible AI deployment.
LO5	Evaluate the effectiveness of current AI governance policies and practices in ensuring accountability, fairness, and ethical use of data in various sectors.
LO6	Create a basic checklist to evaluate the ethical readiness of an implemented AI system, addressing concerns like bias, transparency, data privacy, and user accountability.

Key Skills

Digital (Cognitive and digital skills)

- Understanding the ethical implications of AI in decision-making: Ability to evaluate the ethical concerns related to collection of AI, including issues of bias, transparency, accountability, and fairness.
- Ethical collection and use of data: Knowledge of data protection laws and ethical considerations in collecting, storing, and processing data, particularly in AI-driven systems. Knowledge of accessible/free digital tools that take into account ethical aspects of collection and use of data.

Mindset (Interpersonal and Self-Leadership Skills)

- Ethical aspects of AI technology: Understanding of ethical issues related to the development and implementation of AI, such as fairness, accountability and transparency.
- Principles of transparency and accountability: Knowledge of how to ensure that AI algorithms are transparent and understandable to users and how decisions generated by AI can be monitored.
- Responsibility for data and privacy: Knowledge of the principles of personal data protection and user privacy in the context of collecting, storing and using data in AI systems. Awareness of ethical aspects regarding the use of data and responsibility for their security, as well as understanding how to use AI to minimize the risks associated with privacy breaches.
- Recognizing bias in AI: Ability to identify potential biases and biases in data and AI algorithms that may lead to unfair results or discrimination.
- Ethical awareness: Understanding how AI impacts society and business, including awareness of the moral consequences resulting from decisions made by AI systems. Knowledge of key principles of digital ethics, such as responsibility for the operation of algorithms, data protection and ensuring fairness and transparency in AI activities.
- Ethical leadership: The ability to conduct actions and decisions based on ethical principles, especially in the context of using AI technology in organizations; to consider the long-term impacts of introducing AI, including impacts on society, the labor market and privacy protection.

Critical Contents

1. Introduction to AI Ethics

   This section introduces the foundational concepts of AI ethics, focusing on the principles, values, and societal norms that guide the responsible development and use of AI technologies. Learners will explore ethical frameworks such as fairness, accountability, and transparency, which are essential for ensuring equitable outcomes and upholding human rights. Understanding these ethical foundations is crucial for designing AI systems that align with societal values, foster trust, and support responsible decision-making in various applications.

2. Core Ethical Principles in AI

   This section delves into the foundational ethical principles that guide the development and

deployment of AI technologies. Learners will explore beneficence (promoting good), non-maleficence (avoiding harm), and ensuring that AI contributes to the common good and enhances human well-being. Key topics include addressing fairness, mitigating biases, and preventing discrimination to ensure equitable outcomes for all individuals. Additionally, learners will examine the importance of transparency in decision-making processes, accountability for AI actions, and moral responsibility for their consequences. The section also highlights the need to uphold privacy, ensure data security, and protect human rights in AI applications. Finally, it covers the development of acceptable use policies and related guidelines to ensure the responsible and ethical deployment of AI technologies.

3. AI's Practical and Operational Ethical Challenges

   This section examines the ethical challenges that arise from the deployment of AI technologies across various sectors, such as healthcare, finance, and education, with a focus on sector-specific concerns and societal impacts. Learners will explore the importance of using high-quality, unbiased data to ensure fairness and neutrality in AI systems, preventing discriminatory outcomes. The ethical implications of AI-driven decisions on daily life, including automated job processes, social interactions, and consumer behaviour, will also be addressed. Additionally, this section highlights the need for accuracy and correctness in machine learning models, emphasising the ethical consequences of incorrect or misleading outputs in critical applications. Finally, learners will delve into risk management strategies for AI, focusing on identifying, assessing, and mitigating potential harms to ensure safety and protect users from unintended consequences.

Suggested Learning Experiences

- **Debate on AI and Human Rights:** Engage in critical thinking about the balance between AI innovation and human rights protections: students will participate in a structured debate where they argue for or against the use of AI technologies that potentially infringe on privacy or security. Topics could include facial recognition technology, surveillance, or AI in law enforcement.

  Practical Example: In the debate, learners must reference ethical frameworks and propose safeguards or alternative technologies to protect human rights while maintaining technological progress.

- **Risk Assessment Simulation: Ethical Decision-Making in AI Design:** Develop skills in identifying and managing risks in AI development through ethical decision-making: learners will be given a scenario where they need to design an AI system for a retail business (e.g., an AI-driven recommendation engine). They will perform a risk assessment, identifying potential ethical issues such as data bias, privacy concerns, and accountability.

  Practical Example: Learners will create an ethical framework and risk management plan, ensuring their AI system adheres to principles of fairness, privacy, and transparency, while also protecting against unintended consequences.

- **Case Study Analysis: Ethical Dilemmas in AI Deployment:** Apply ethical frameworks to real-world AI deployment scenarios across various sectors: learners will review case studies where AI systems have raised ethical concerns in fields like healthcare, finance, or criminal justice. They will analyse the ethical issues involved (e.g., bias, privacy violations, fairness) and apply ethical principles like fairness, accountability, and transparency to propose solutions.

  Practical Example: Learners may explore a case where AI in recruitment practices unintentionally discriminated against certain groups and suggest measures to mitigate bias in algorithmic decision-making.

Assessment Methods

- **Comprehensive Ethical AI Report and Presentation:** This assessment method consolidates the learning from the activities by requiring learners to produce a comprehensive report and deliver a presentation on the ethical considerations in the design and deployment of an AI system. The report will address real-world ethical dilemmas and risk management strategies, while the presentation will demonstrate their ability to articulate the ethical principles and solutions they've developed.

  Report:

  - **Content**: Students will choose a specific AI technology (e.g., facial recognition, AI in hiring, or automated decision-making in healthcare) and analyze its ethical implications across multiple sectors.
  - **Structure**: Introduction with overview of the chosen AI technology and its application in the real world; Ethical Analysis with frameworks (e.g., fairness, accountability, non-maleficence) to examine the potential risks, biases, and human rights concerns associated with the technology; Risk Management Plan for addressing ethical risks, including transparency, accountability, and privacy protection; and Proposed Solutions for ethical deployment, including suggestions for improving fairness, reducing bias, and ensuring the technology benefits society without causing harm.
  - **Presentation**: Learners will present their findings from the report in a structured format to their peers or instructors. The presentation should include: an overview of the ethical issues identified, proposed solutions for managing risks and ensuring fairness and transparency, justifications for the recommendations, referencing ethical principles discussed in class.

  Practical Example: A learner might choose to analyse the ethical use of AI in hiring processes, discussing the potential for discrimination and bias. In their report, they would assess how these biases can be mitigated through algorithmic transparency and diversity in training data. In their presentation, they would summarise their findings and advocate for specific risk management policies to ensure ethical AI use in recruitment.

This assessment method ensures that learners not only understand the ethical implications of AI technologies but also learn how to apply ethical principles in real-world contexts, making decisions that align with societal values.

Learning Block 6. Machine Learning in Retail

This learning block explores how Machine Learning (ML) is transforming retail by enabling personalised experiences, optimising operations, and enhancing customer engagement. The focus is on developing the skills needed to understand, implement, and evaluate ML tools that support efficient, sustainable retail practices.

Generalisations

- AI-driven systems learn from and adapt to patterns, enabling organisations to deliver more personalised and efficient experiences.

Guiding Questions

- What are the primary ML technologies used in retail, and how do they function?
- How can ML applications, like recommender engines or dynamic pricing, enhance customer satisfaction while benefiting business goals?
- How should retail companies balance the benefits of targeted advertising with concerns about consumer privacy and data security?

Learning Outcomes

LO1	Identify key applications of Machine Learning in retail, such as customer segmentation, dynamic pricing, and recommendation systems.
LO2	Explain how ML models process retail data to optimise inventory, personalise customer experiences, and forecast trends.
LO3	Use ML-driven tools to perform tasks such as analysing customer behaviour, predicting demand, and automating inventory management.
LO4	Analyse the impact of ML applications, such as dynamic pricing or recommendation engines, on customer satisfaction and business efficiency.
LO5	Evaluate the effectiveness of ML models in retail operations, considering factors like accuracy, scalability, and ethical implications.
LO6	Create interactive data visualisations using AI-powered tools to display basic retail metrics, such as daily sales, product categories, or stock availability, to support informed decision-making.

Key Skills

Digital (Cognitive & Digital Skills)

- Basic statistical knowledge: Understanding statistical techniques, such as linear and multiple regression, and their application to analyse relationships between variables.
- Working with large data sets: Using tools such as Python, R or BI tools (e.g. Power BI, Tableau) to work with large data sets and perform more complex analyses.
- Applying machine learning (ML) to retail: Ability to create and implement machine learning models to predict demand, customer segmentation and product recommendations.
- Predictive analysis of customer behaviour: Using ML techniques to analyse historical data to predict future customer behaviour and identify market trends.
- Automate pricing and inventory management with ML: Using ML for dynamic price optimization and real-time inventory management, which increases operational efficiency.
- Optimization of marketing campaigns: Using ML to personalise marketing campaigns by analysing customer preferences and demographics to increase the effectiveness of promotional activities.
- Advanced data visualisations: Ability to create interactive data visualisations in tools such as Python (Matplotlib, Seaborn), Power BI or Tableau.

Mindset (Interpersonal & Self-Leadership Skills)

- The ability to think innovatively: A proactive approach to implementing ML-based innovations to improve operational efficiency and build competitive advantage.
- ML risk management: Ability to assess potential risks resulting from the use of machine learning and their minimization in operational processes. (M)
- Teamwork in ML implementation: Ability to collaborate with various departments (e.g. IT, marketing, sales) to implement ML tools in retail (M)

Critical Contents

1. Strategic Problem-Solving with AI

   Learners will develop the ability to work collaboratively within multidisciplinary teams, a fundamental skill for successful AI adoption. They will gain an understanding of the unique roles and contributions of team members from diverse departments such as IT, marketing, and operations, ensuring that everyone's expertise is utilized effectively. Emphasis will be placed on communicating complex AI concepts in a clear and accessible manner to non-technical stakeholders, fostering alignment on project goals and outcomes. Learners will also navigate the challenges of integrating AI solutions into existing workflows, promoting a culture of collaboration and innovation. By mastering the management of cross-functional workflows, learners will ensure smooth transitions from AI model development to practical deployment. Moreover, they will learn to leverage team diversity to design AI systems that address a range of operational needs, ultimately enhancing organizational efficiency and effectiveness.

2. Collaboration in AI Projects

   Learners will enhance their ability to collaborate effectively within multidisciplinary teams, a vital skill for the successful adoption of AI technologies. They will develop a clear understanding of the unique roles and contributions of team members from diverse departments such as IT, marketing, and operations, fostering a cohesive approach to AI implementation. Communication skills will be honed to translate complex AI concepts into clear, actionable insights for non-technical stakeholders, ensuring alignment on project goals and expectations. Learners will learn to navigate the challenges of integrating AI solutions into existing workflows by cultivating a culture of innovation and teamwork. They will also acquire skills to manage cross-functional workflows seamlessly, enabling smooth transitions from AI model development to practical deployment. By leveraging the diversity of team expertise, learners will design AI systems that address various operational needs, driving improved efficiency and organizational effectiveness.

3. Data-Driven Decision Making

   Learners will develop expertise in harnessing data as a fundamental component of operational decision-making. They will learn to identify and extract relevant data from both internal and external sources, such as customer behavior patterns, market trends, and operational metrics, ensuring they capture the most impactful insights. The process will include cleaning, processing, and preparing raw data to guarantee accuracy, consistency, and readiness for AI applications. Through exploratory data analysis, learners will uncover critical insights that can inform strategic decisions, using statistical tools and programming languages like Python and R to interpret data and present actionable recommendations effectively to stakeholders. By embedding data-driven thinking into organizational practices, learners will enhance operational agility, enabling businesses to adapt quickly to changing conditions and gain a competitive edge in the market.

4. Risk Assessment in AI Implementation

   Learners will become proficient in identifying and mitigating the risks associated with AI technologies, ensuring their responsible and effective implementation. This includes evaluating the reliability and accuracy of AI models in operational contexts to prevent errors that could result in financial losses or reputational harm. They will develop a strong understanding of the ethical implications of AI, such as biases in algorithms, privacy concerns, and potential misuse of AI tools. Additionally, learners will assess operational risks related to AI integration, including disruptions to existing processes, over-reliance on AI outputs, and the need for continuous model maintenance. They will also create robust strategies for monitoring AI systems to ensure consistent performance and adaptability to changing business needs. Finally, learners will design contingency plans to address potential AI failures, minimizing operational disruptions and safeguarding business continuity.

5. Interactive Data Visualization

   Learners will master the ability to create and communicate complex insights through interactive data visualizations, using tools like Python (Matplotlib, Seaborn), Tableau, or Power BI to design dashboards that effectively highlight key performance indicators and trends. They will learn to craft visualizations that clearly convey data-driven insights, ensuring comprehension by both

technical and non-technical audiences. Additionally, learners will develop interactive reports that enable stakeholders to explore data dynamically, uncovering specific insights tailored to their needs. Emphasis will be placed on using visual storytelling to illustrate the impact of AI-driven solutions, making it easier for stakeholders to understand and appreciate the value of proposed initiatives. Finally, learners will refine their visual design techniques to prioritize clarity, accuracy, and engagement, ensuring impactful communication of data insights.

Suggested Learning Experiences

- **Hands-on Workshop:** Hands-on Workshop: In this interactive workshop, learners will build a basic recommender engine using retail data, guiding them through the foundational steps of designing and implementing a recommendation system. Through hands-on experience, they will gain an understanding of how ML algorithms identify patterns in customer data, predict preferences, and provide product recommendations. By testing the model with real or simulated retail data, learners can observe how recommendation engines drive personalization in retail, enhancing customer engagement and increasing sales. This exercise will foster skills in data handling, model training, and result interpretation.

- **Interactive Simulation:** Learners will participate in a dynamic simulation to experiment with pricing models and analyse their impact on customer engagement and sales. Using dynamic pricing algorithms, they will observe how prices adjust in response to factors such as demand, competition, and customer behaviour. The simulation will highlight how businesses use ML to maximise revenue while responding to market changes. It will also include a component on ethical considerations, prompting learners to reflect on the potential risks of dynamic pricing, such as fairness and accessibility for consumers. This experience will build skills in data analysis, model manipulation, and ethical evaluation.

- **Ethics Debate:** In this structured debate, learners will engage in discussions on privacy and data ethics, specifically focusing on the use of targeted ads in retail. They will research and present arguments on topics such as consumer consent, data security, and the fine line between personalization and intrusion. The debate will incorporate discussions on regulatory guidelines, best practices, and the importance of transparency in data collection and usage. This exercise will foster critical thinking, ethical awareness, and persuasive communication skills, enabling learners to articulate and defend their viewpoints on responsible AI use in retail.

- **Case Study Analysis:** In this session, learners will examine real-world case studies showcasing successful applications of ML in retail, with a focus on targeted ads, chatbots, and dynamic pricing. Through a structured analysis, learners will explore how these technologies were applied, the challenges encountered, and the outcomes achieved. By studying specific examples, they will gain insights into the strategies used by leading retailers to personalise customer experiences, improve engagement, and optimise pricing. This activity will also encourage critical thinking as learners

consider how these ML applications balance business objectives with ethical considerations like privacy and transparency.

- **Sustainability Exercise:** This activity will involve a detailed examination of a retail supply chain to identify opportunities for improving efficiency and sustainability using ML. Learners will analyse various stages of the supply chain—from sourcing to delivery—to propose ML-driven optimizations, such as reducing waste, enhancing inventory management, and optimising delivery routes to lower emissions. By exploring how ML can contribute to greener retail operations, learners will build an understanding of how technology can support sustainable practices. This exercise will develop skills in environmental analysis, systems thinking, and problem-solving within the context of sustainable retail operations.

Assessment Methods

- **Practical Demonstration:** Learners demonstrate their ability to set up and run a dynamic pricing simulation, analysing results and drawing conclusions on retail impact.
- **Quizzes and Exams:** Test understanding of ML concepts, applications, and the impact on retail operations and sustainability.
- **Reflective Essays:** Learners reflect on the ethical considerations of ML in retail, discussing data privacy and sustainability impacts.
- **Project-Based Assessment:** Learners complete a project developing a basic ML model (e.g., a simple recommendation engine) and present their findings.
- **Group Presentation:** Teams present case studies on successful retail applications of ML, addressing the benefits, challenges, and ethical concerns.

Learning Block 7. Natural Language Processing (NLP) in Retail

The application of NLP in the retail industry, focusing on sentiment analysis, recommendation systems, chatbots, and semantic-based search. It aims to equip retailers with practical NLP skills tailored to improve customer experiences, support sustainable customer relationship management, and drive innovative approaches within retail environments.

Generalisations

- AI-driven natural communication systems can enhance interaction and understanding between businesses and customers.

Guiding Questions

- What is Natural Language Processing, and how does it apply to retail?
- How can NLP-powered sentiment analysis improve customer satisfaction and retention?
- To what extent should NLP-powered bots replace human customer service agents?

Learning Outcomes

LO1	Identify key NLP technology concepts such as sentiment analysis, recommendation systems, and chatbots, and their roles in retail applications.
LO2	Explain how NLP-powered tools, like chatbots or recommendation systems, improve customer engagement and satisfaction through personalised recommendations.
LO3	Use NLP tools to analyse customer interactions, such as reviews and queries, to extract insights and improve customer service.
LO4	Analyse the effectiveness of NLP applications, like chatbots and recommendation systems, in addressing specific customer service challenges in retail.
LO5	Evaluate the ethical implications of NLP in retail, focusing on privacy, bias, and transparency, and propose strategies to mitigate these risks.
LO6	Create simple customer service strategies utilising an NLP tool, such as a chatbot or virtual assistant, tailored to enhance customer experiences and support business objectives in retail.

Key Skills

Digital (Cognitive & Digital Skills)

- Using NLP to analyse customer interactions: Applying NLP technology to analyse customer reviews, social media inquiries and customer service interactions to improve communication and shopping experiences.
- NLP-based recommendation systems: Implementation of recommendation systems based on natural language analysis that suggest products to customers based on their previous purchases and preferences.
- Chatbots and virtual assistants in commerce: Using chatbots and NLP-based virtual assistants and intelligent agents to automate customer service, provide quick responses and improve customer engagement.
- Customer sentiment analysis: The use of NLP to analyse customer sentiment, which enables monitoring opinions and moods towards the company's products and services.

Mindset (Interpersonal & Self-Leadership Skills)

- Creativity in the use of NLP: Ability to use NLP tools in a non-standard way to create new, more effective customer service strategies (M)
- Adaptability to natural language technologies: Ability to flexibly implement NLP tools and adapt them to the changing needs of the company and customers.
- Customer relationship management: Ability to build and maintain long-term customer relationships with the support of NLP technologies that help better understand customer needs and preferences.

Critical Contents

1. Analyze customer data using NLP to generate insights that inform business strategies
   Learners should grasp the fundamentals of Natural Language Processing (NLP), which involves the analysis of unstructured text data to identify meaningful patterns and trends. It is essential to be familiar with tools such as text classification, topic modeling, and keyword extraction, as these techniques are foundational for analyzing customer interactions. Additionally, knowledge of data visualization and interpretation is crucial for translating raw insights into actionable business strategies that support decision-making.

2. Implement and customize NLP-powered chatbots and recommendation systems
   To excel in this field, learners must have a foundational understanding of how Natural Language Processing (NLP) drives conversational AI and personalized user experiences. They should be knowledgeable about chatbot frameworks, natural language understanding (NLU), and intent detection methods, as well as collaborative filtering and content-based recommendation

algorithms. This foundational knowledge enables learners to adapt and fine-tune these tools to meet specific business objectives and address customer needs effectively.

3. Apply sentiment analysis tools to gauge customer sentiment and adjust products/services based on feedback
   Learners need to understand the fundamentals of sentiment analysis, which includes detecting polarity, classifying emotions, and utilizing pre-trained models or custom datasets. It's essential to grasp the importance of data preprocessing techniques, such as tokenization and lemmatization, as well as evaluation metrics like accuracy and the F1 score. This knowledge will enable them to effectively assess customer attitudes, which is crucial for refining offerings based on detailed customer feedback.

4. Demonstrate adaptability and creativity in the use of NLP to improve customer experience
   Learners should develop a mindset that blends technical skills with innovative problem-solving. They need to have a solid understanding of various natural language processing (NLP) applications, such as sentiment detection, chatbots, and language translation, as well as their potential to improve customer interactions. This foundational knowledge enables learners to creatively adapt existing technologies or devise new approaches aimed at enhancing customer satisfaction and loyalty.

Suggested Learning Experiences

- **Collaborative exercises where retailers analyse each other's NLP-driven solutions for a given problem, providing feedback to enhance adaptability and creativity:** In this collaborative session, retailers will present their NLP solutions to peers and receive constructive feedback on their approach. By analysing and evaluating each other's work, retailers will develop adaptability in responding to feedback and exploring alternative methods. This peer review activity not only fosters creativity in problem-solving but also reinforces key skills in adapting NLP applications to suit diverse customer and business needs within retail.

- **Develop a basic NLP-powered chatbot or recommendation system using beginner-friendly tools like Dialogflow or ChatGPT API:** Retailers will gain hands-on experience by creating a simple chatbot or recommendation engine using tools such as Dialogflow or the ChatGPT API. These platforms offer user-friendly interfaces and require minimal technical expertise, making it easier to design and customise NLP applications. Learners will explore how to tailor these solutions to address hypothetical customer needs, such as answering inquiries, recommending products, or providing personalised shopping assistance. This activity will help retailers understand the essential processes behind building NLP-driven tools while focusing on enhancing customer engagement and satisfaction.

- **Use scenarios where retailers decide between different NLP applications to address specific customer service challenges:** This scenario-based exercise will challenge retailers to select and justify the best NLP approach—such as chatbots, sentiment analysis, or recommendation

systems—for a variety of retail scenarios. Each scenario will present a customer service challenge that could benefit from NLP, like handling high volumes of customer queries or identifying trends in customer feedback. Retailers will strengthen their decision-making skills by evaluating the advantages and potential trade-offs of each tool in meeting the given objectives.

- **Examine real-world retail cases where NLP tools have successfully improved customer interaction and business outcomes:** In this activity, retailers will review and discuss case studies from leading retail brands that have integrated NLP tools to enhance customer experiences and drive business growth. For example, they might analyse how sentiment analysis allowed a brand to monitor shifts in customer mood and adjust its communication or product offerings. By identifying the key strategies and outcomes of these implementations, retailers will gain insight into the practical benefits and limitations of NLP technologies in retail.

Assessment Methods

- **Capstone Project – NLP Application Design:** This capstone project invites retailers to apply their knowledge by designing a functional NLP application, such as a sentiment analysis tool, tailored for a retail scenario. This project assesses retailers' grasp of NLP concepts, their ability to integrate these into a practical solution, and their understanding of the impact of NLP on customer experiences. Through this hands-on project, retailers demonstrate their technical skills and decision-making abilities, culminating in a solution that showcases their comprehension and creativity in applying NLP to real-world retail challenges.

- **Case Study Analysis – Theory to Practise:** Retailers analyse real-world cases of NLP implementation within retail, evaluating its impact on customer engagement and business outcomes. This assessment measures their critical thinking abilities and understanding of how theoretical NLP principles translate to practise. Retailers reflect on the strategic choices made in each case, analysing successes and potential improvements, which deepens their understanding of how NLP can influence customer service and satisfaction.

- **Simulation and Role-play:** Adaptability and Creativity: In simulation exercises, retailers respond to dynamic customer interaction scenarios using NLP tools, such as chatbots or recommendation systems. This assessment focuses on adaptability, requiring retailers to navigate evolving scenarios and apply NLP solutions creatively. By role-playing different customer situations, they refine their ability to tailor NLP applications based on customer needs and exhibit flexibility in adopting NLP strategies under changing conditions.

- **Knowledge Checks:** Comprehension and Reflection on Ethical Implications: Through quizzes and reflective prompts, retailers demonstrate their understanding of key NLP concepts and retail applications. This assessment method also includes reflective questions on ethical considerations and the limitations of NLP in customer service, allowing retailers to express their thoughts on responsible AI use in retail. These reflections encourage them to consider the broader implications of NLP, fostering a holistic understanding of its potential and constraints.

Learning Block 8. Driving Human-Centred Innovation with AI

Using AI tools to develop innovative services, products, and solutions that align with customer needs and values. This block focuses on prioritising user experience and implementing ethical strategies, ensuring seamless integration with human contexts.

Generalisations

- Innovative technologies achieve greater success when designed with a deep understanding of end-users' needs and values.
- The ethical use of AI requires strategies that balance innovation with social impact and respect for user rights.
- AI-based solutions and products are more effective when they are intuitive and seamlessly integrated into human contexts, enhancing daily life and simplifying interactions.

Guiding Questions

- How does a human-centred approach in AI influence the effectiveness and acceptance of new technologies?
- How can AI help retailers better understand and respond to changing customer preferences?

Learning Outcomes

LO1	Identify human-centred AI principles, such as usability and accessibility.
LO2	Describe how AI tools can enhance user experiences and support innovation in retail by simplifying processes, personalising interactions, and meeting customer needs.
LO3	Use AI solutions that aim to improve customer and employee experiences by providing more intuitive and user-friendly solutions.
LO4	Analyse AI-driven innovations in retail, identifying their strengths and limitations in addressing human-centric values.
LO5	Evaluate the ethical and social implications of AI adoption in retail, such as privacy concerns, accessibility, and transparency, and propose strategies to mitigate potential risks.

LO6	Design a human-centred AI solution (e.g., a personalised chatbot, inventory management tool, or recommendation system) that addresses a specific retail challenge, ensuring alignment with ethical standards and user needs.

Key Skills

Digital (Cognitive & Digital Skills)

- Applying AI to human-centric innovation: Implementing AI tools that aim to improve customer and employee experiences by providing more intuitive and user-friendly solutions (E)
- Designing AI solutions with users in mind: The ability to create AI systems that are easy to use and designed with the end user in mind, minimising technological access barriers (E)
- AI in the transformation of business processes: Applying AI to optimise business processes in a way that emphasises human-centric values such as convenience, personalisation and accessibility (M)

Mindset (Interpersonal & Self-Leadership Skills)

- Technology empathy: Understanding user needs and the ability to design AI technologies that respond to these needs in a friendly and inclusive way (E)
- User-centric innovation: Ability to promote innovative solutions that improve customer interactions with technology while increasing the company's operational efficiency
- Change management from a human perspective: The ability to effectively manage change in an organisation when new AI technologies are implemented to improve interactions with people (M)

Critical Contents

1. Human-centred design in AI systems
   In this section, learners are introduced to the concept of human-centred innovation in the context of AI. Human-centred innovation focuses on creating AI solutions that enhance end users' experiences - be they customers or employees - by making interactions more personalised, accessible, and convenient. Through a blend of human creativity and AI's computational power, learners will explore how this approach differs from traditional technology-driven methods by emphasising empathy, usability, and inclusiveness in AI design; with an active learning approach, learners will engage in problem-solving and tackle real-world challenges, reinforcing the importance of placing users at the heart of AI-driven innovation to build impactful, sustainable solutions in today's digital landscape.

2. Applying AI to human-centric innovation
   This section focuses on the practical application of AI tools that aim to improve human experiences. Whether it's improving the customer experience or optimising employee workflows, AI can be harnessed to create more intuitive and user-friendly solutions. Learners will dive into case

studies where AI has been applied to enhance personalisation, improve customer service, or streamline internal business processes with the user in mind. Emphasis will be placed on using AI to eliminate complexities and provide seamless, efficient solutions that anticipate the needs of users. This section also covers how to choose AI tools that align with human-centric goals and how to integrate them into existing business structures.

3. Designing AI solutions with users in mind

For retail workers and managers, the key to successfully integrating AI into daily operations lies in designing solutions that are easy to use, intuitive, and tailored to the needs of both customers and employees. This section will explore how AI systems can be developed with a focus on enhancing the retail experience, minimising barriers, and ensuring that the technology serves the people who interact with it rather than complicating their experience.

Retailers should understand the importance of designing AI tools that are user-friendly and accessible. In this context, "user-friendly" means creating systems that employees can easily operate without needing specialised technical knowledge, and "accessible" means ensuring that customers of all backgrounds can interact with AI tools seamlessly, regardless of their familiarity with technology. For example, AI systems like customer service chatbots or personalised recommendation engines must be designed to offer simple, easy-to-understand interactions. This makes them more welcoming for users who may not be technologically savvy.

Retail managers and workers should consider how AI can streamline everyday tasks, such as helping employees manage inventories or assisting customers in quickly locating products. When designing these AI systems, it's crucial to integrate both design thinking and systems thinking to create solutions that truly meet the needs of end users—whether store staff or customers. Employees should be able to navigate AI-powered tools, like stock-checking apps or automated checkout systems, intuitively and without extensive training. Similarly, customers should feel at ease using self-service kiosks or AI-driven shopping assistants, avoiding any confusion or frustration. By applying design thinking to prioritise user experience and systems thinking to anticipate broader impacts, designers can create AI tools that are accessible, efficient, and beneficial for all stakeholders in the retail environment.

This section will emphasise the importance of reducing barriers to using AI in retail. Barriers can take many forms, including overly complex interfaces, unclear instructions, or a lack of personalisation. For instance, if an AI-powered checkout system is too complicated, both customers and staff may become frustrated, leading to a negative experience. Retail managers must ensure that any AI tool implemented in their stores is designed to be as intuitive as possible, with clear instructions and minimal steps required to complete tasks.

Additionally, personalising the user experience is critical for customer satisfaction. Retailers can use AI to create tailored shopping experiences by offering personalised recommendations based on customer preferences and past behaviours. However, it's essential to balance personalisation and privacy, ensuring that customers feel their data is being used responsibly and with their

consent. Managers should be aware of the importance of transparency in how AI systems collect and use customer data, as building trust is key to long-term customer relationships.

Finally, this section will cover the importance of continuous feedback from users—both customers and employees. By regularly gathering feedback, retailers can identify issues with AI systems and make necessary adjustments to improve usability. Engaging employees in the design process by asking for their input on AI tools can lead to better adoption and smoother operations. Similarly, listening to customer feedback ensures that AI systems meet their needs and provide a positive shopping experience.

4. Technology empathy and user experience

   Technology empathy is a crucial skill for anyone involved in developing or implementing AI systems, emphasising an understanding of user needs and how AI technologies can be designed to meet these needs in an inclusive, intuitive, and friendly way. This section encourages learners to appreciate the subjective experiences, or qualia, that shape how users perceive and interact with technology—the nuances of a customer's interaction with an AI-powered chatbot or an employee's engagement with AI-driven analytics tools. Through exercises that help learners adopt the end user's perspective, they will deepen their sensitivity to these raw, individual sensory experiences that cannot be fully conveyed through objective measures alone. By fostering technology empathy, learners will be equipped to anticipate challenges and design AI solutions that genuinely address user pain points, enhancing engagement and overall satisfaction.

5. Promoting user-centric innovation

   In this section, learners will explore strategies for driving innovation that prioritises the user experience. It will cover how to promote AI-powered solutions that improve customer interactions with technology and enhance operational efficiency within the company. The section emphasises the importance of balancing innovation with usability, ensuring that AI solutions are aligned with the needs and expectations of the users. Learners will also learn how to create AI-driven innovations that are flexible and adaptable, allowing for continuous improvement as user needs evolve. By the end of this section, participants will clearly understand how to champion AI innovations that make both business operations and user experiences more effective and enjoyable.

6. Managing change from a human perspective

   Introducing AI technologies into an organisation involves more than just technical setup; it requires thoughtful management of the accompanying change. In this section, learners will explore strategies for implementing AI with a focus on its human impact, emphasising that change occurs effectively when it has purpose and meaning for those involved. Learners will engage with change management approaches that prioritise clear communication, inclusivity, and employee engagement, helping to foster a positive perception of AI. Special attention will be given to understanding and addressing potential employee fears or resistance by highlighting the meaningful human benefits AI systems can offer. This section also covers how to create a culture of adaptability and continuous learning, empowering employees to embrace and collaborate with AI technologies as part of a purposeful transition.

Suggested Learning Experiences

- **Design thinking workshops on human-centred AI design**: A design thinking workshop can support learners in applying user-centred design principles and tools to develop a prototype for an AI tool to improve retail experiences. The session will guide participants through defining user personas, mapping user journeys, and identifying potential barriers to AI interaction. As an example, instructors can facilitate a workshop where learners design an AI-powered customer service chatbot that simplifies and personalises interactions, with features tailored to users with limited technical knowledge.

- **Systems thinking in human-centred AI design**: A hands-on workshop to introduce participants to systems thinking as a tool for developing human-centred AI solutions. Through collaborative exercises, participants can explore how to anticipate and address the broader social and ethical impacts of AI, ensuring solutions that are effective and aligned with user needs and societal values. By examining real-world scenarios, participants can learn to map out complex interactions, identify potential unintended consequences, and integrate user-centred design principles to create AI solutions around their users' needs. This workshop aims to equip participants with practical strategies to foster sustainable, user-focused innovation in AI.

- **Customer journey mapping**: Learners develop customer journey maps to identify key pain points and opportunities for AI-driven improvements in retail environments. These maps help to illustrate how AI can enhance the overall customer experience. Example: Learners can map a customer's journey with a retail brand, identifying moments where AI can offer personalised assistance, from product discovery to checkout, both online and in-store.

- **Self-paced learning modules on human-centred AI innovation**: A series of video modules and interactive tasks designed to introduce learners to the fundamentals of human-centred AI. This includes practical examples of user-focused AI in retail, with follow-up reflection prompts to reinforce understanding of customer-centric design principles.

- **Workbook exercise on AI design strategy**: A guided workbook can walk learners through a step-by-step process for designing a human-centred AI strategy, including defining target user groups, mapping user needs, and planning for inclusivity. The workbook includes guiding questions and reflection prompts for self-assessment. For example, the workbook may guide learners through designing an AI-driven stock management tool that employees without technical backgrounds can use confidently, with reflection questions on accessibility.

- **Case study analysis of successful AI implementations in retail**: An in-depth case study analysis task that allows learners to examine real-world examples of AI applications in retail. Learners can evaluate the factors contributing to these successes and their impact on customer experience. Example: Learners can analyse how a company like Amazon or Sephora has used AI to provide personalised recommendations and how these innovations have impacted customer loyalty and satisfaction.

Assessment Methods

- **Scenario-based assessment:** This assessment method can be useful for evaluating learners' understanding of human-centred design principles and their ability to apply them in a real context. Learners can be presented with a retail-specific scenario in which they must design or improve an AI tool that enhances customer experience or business processes while maintaining a strong focus on human-centred design principles. The scenario challenges learners to propose solutions that meet real customer needs, improve usability, and integrate AI seamlessly into existing workflows.
  Evaluation criteria: The assessment focuses on how well learners understand user needs, the creativity and practicality of their AI solution, and the degree to which the proposed AI tool improves the customer experience or business process in a human-centred way.
  Example: Learners are presented with a scenario where a retailer is facing challenges with online customer engagement. They are tasked with proposing an AI-powered solution, such as a virtual shopping assistant or personalised recommendation engine, that addresses the problem while considering accessibility, ease of use, and seamless interaction between the online and in-store experience.

- **Change management simulation**: Learners may participate in a simulation exercise that involves managing organisational change as AI technologies are introduced, focusing on human-centric outcomes. Some examples are provided below.

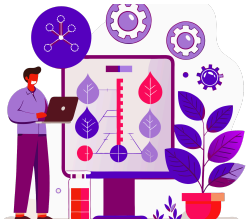
- **Role-playing simulation:** a role-play activity where learners take on different roles within an organisation (e.g., AI developer, HR manager, sceptical employee, department head). Each role comes with unique objectives, concerns and responses to the AI integration, requiring participants to negotiate and collaborate to ensure a smooth, human-centred change process.

- **Gamified workshop:** A gamified workshop where participants work in teams to solve challenges related to AI implementation. Each challenge addresses a real-world obstacle (e.g., resistance to change, skill gaps, ethical concerns), and teams earn points for creative, human-centred solutions. This fosters collaboration and engagement while providing insights into real-world applications of change management principles.

- **Time-progress simulation game:** a time-based scenario where learners must integrate an AI solution over several phases, each representing a different stage of change management (e.g., initial communication, training sessions, follow-up support). At each phase, they receive feedback on employee satisfaction, productivity, and morale, allowing them to adjust their approach based on human-centred outcomes.

- **Escape room simulation:** an "organisational escape room" where learners solve puzzles to overcome obstacles in AI integration, with clues based on understanding human factors like empathy, clear communication, and managing resistance. This adds an element of fun and teamwork while reinforcing key concepts in change management.

Learning Block 9. AI for Sustainability



Identifying and selecting the set of insight data that impact the environmental footprint in order to understand what AI-powered sustainability solutions can reduce energy consumption, optimise resource utilisation, and minimise waste for a sustainable digital future while accelerating the transition towards a circular economy.

Generalisations

- AI systems can have both positive and negative impacts on the environment, depending on how they are designed, implemented, and used.
- AI can support sustainable practices by optimising resource use and balancing business growth with environmental responsibility.

Guiding Questions

- How can AI impact the environment?
- How can retailers use AI to reduce their carbon footprint?

Learning Outcomes

LO1	Define key terms and concepts related to AI and sustainability.
LO2	Explain how AI technologies can influence environmental footprints positively and negatively.
LO3	Apply AI tools to optimise resource utilisation and propose strategies for optimising energy consumption in retail operations.
LO4	Analyse sustainability challenges related to AI systems.
LO5	Evaluate the effectiveness of AI-driven solutions in reducing carbon footprints and achieving sustainability goals.
LO6	Design a sustainable AI-powered solution for a hypothetical retail challenge, ensuring alignment with circular economy principles.

Key Skills

Digital (Cognitive & Digital Skills)

- Sustainable development powered by AI: Using AI to optimise business processes to minimise carbon footprint, save resources and promote sustainable development practices (M)
- Resource optimisation with AI: Using AI to effectively manage company resources such as energy, water and materials to reduce waste and costs (M)
- Application of AI to monitor and report ecological footprint: Using AI technology to monitor the environmental impact of a company's activities and generate sustainability reports (E)

Mindset (Interpersonal & Self-Leadership Skills)

- Sustainable Innovation Initiative: Promoting innovations that combine sustainability goals with the capabilities of AI technologies, delivering benefits for both the business and the environment
- Change management for sustainable development: Ability to lead and manage organisational change that supports sustainable development goals while ensuring efficiency and profitability (M)

Critical Contents

1. Introduction to AI and sustainability

   Retailers increasingly use AI to improve customer interactions, optimise inventories, and personalise marketing efforts. However, AI systems are not only technological innovations but also socio-technical-ecological systems that have broader implications. To begin with, sustainability in the context of AI encompasses not just the environmental impacts, but also social and economic dimensions. For retailers, this means that AI systems—like customer recommendation algorithms or inventory management tools—are tied to wider societal and ecological challenges. Retailers must consider how these systems impact energy consumption, supply chains, and workforce management while ensuring that AI enhances customer experiences and business growth responsibly.

2. AI's role in achieving the Sustainable Development Goals (SDGs)

   AI has significant potential to help retailers meet global sustainability goals. It can streamline operations, improve resource management, and offer insights that support sustainability efforts such as waste reduction and energy efficiency. For example, AI can forecast consumer demand with greater accuracy, reducing overproduction and excess inventory, thus aligning with sustainability goals related to responsible consumption and production. However, retailers need to be aware of the trade-offs. The same AI technologies that help optimise store operations might also contribute to environmental harm through increased energy consumption in data centres. This section will explore how retailers can navigate these challenges by integrating AI solutions that support, rather than hinder, the achievement of sustainability objectives.

3. Understanding Sustainable AI vs. AI for Sustainability

When discussing AI and sustainability, it is important to distinguish between two concepts: AI for sustainability and sustainable AI. AI for sustainability refers to the ways in which AI can be leveraged to achieve sustainability goals, such as reducing carbon footprints or managing supply chains more efficiently. In contrast, sustainable AI focuses on the sustainability of the AI technology itself, including its energy consumption, material usage, and overall environmental footprint. Retailers often use AI to monitor logistics, analyse customer behaviour, or automate marketing, but they also need to be conscious of how sustainable these systems are. For instance, training large AI models can consume substantial energy, and retailers must consider strategies to reduce this impact, such as using more energy-efficient algorithms or adopting cloud services with renewable energy sources.

4. Sustainability challenges in AI systems

Retailers are under increasing pressure to ensure their operations are profitable, environmentally, and socially responsible. AI systems, while offering many benefits, pose several sustainability challenges. One of the key challenges is energy consumption, especially for AI models that require intensive computational power. Retailers using AI to optimise supply chains or improve customer personalisation must understand the environmental cost of running such systems. There are also social challenges, such as ensuring fairness and avoiding bias in AI-driven decisions. For example, automated pricing or customer segmentation systems could inadvertently discriminate against certain demographic groups. Retailers must adopt transparent AI systems that provide fair outcomes for all consumers. On the economic front, adopting AI can lead to concerns over job displacement and market concentration, which retailers need to proactively address by fostering a responsible transition towards AI adoption.

5. The SCAIS Framework: Assessing AI for sustainability

The Sustainability Criteria and Indicators for Artificial Intelligence Systems (SCAIS) Framework developed by Rohde et al.[12] provides a comprehensive method for assessing the sustainability of AI systems across social, environmental, and economic dimensions. For retailers, this framework can be used to evaluate the sustainability impact of AI technologies at every stage of their lifecycle—from development and implementation to deployment and ongoing use. The SCAIS framework highlights key criteria such as transparency, fairness, and energy efficiency, which are crucial for sustainable AI development. Retailers can apply this framework to ensure that their AI systems are effective and responsible. This section will introduce the SCAIS framework and provide examples of how retailers can integrate its indicators into their business practices, such as evaluating the environmental efficiency of AI-powered logistics systems or ensuring that AI-driven customer engagement tools uphold standards of fairness and inclusivity.

6. AI lifecycle and sustainability

AI systems in retail follow a lifecycle that spans from their initial conceptualisation to their ongoing

[12] Rohde, F., Wagner, J., Meyer, A., Reinhard, P., Voss, M., Petschow, U., & Mollen, A. (2024). Broadening the perspective for sustainable artificial intelligence: Sustainability criteria and indicators for artificial intelligence systems. *Current Opinion in Environmental Sustainability, 66*, 101411. https://doi.org/10.1016/j.cosust.2023.101411

use in business operations. Sustainability considerations need to be integrated into every stage of this lifecycle. For instance, during the development phase, retailers should ensure that the data used to train AI models is ethically sourced and relevant to reducing environmental impact. During the deployment phase, assessing the energy consumption of AI systems and implementing measures to minimise this, such as utilising more efficient algorithms or relying on cloud providers that prioritise renewable energy is critical. Additionally, the disposal of hardware used for AI systems should follow sustainable practices, such as recycling or repurposing components to reduce electronic waste. This section will guide retailers in implementing sustainable practices throughout the AI lifecycle, ensuring that their AI initiatives are innovative and responsible.

Suggested Learning Experiences

- **Data analysis workshops for AI-driven sustainability**: An interactive workshop where learners work with real-world data to evaluate the energy consumption of AI systems and propose methods to optimise retail operations with minimal environmental impact. Participants assess both the positive and negative environmental implications of AI in retail and consider using the SCAIS Framework to improve AI practices. Example: Learners analyse the energy consumption of data centres involved in AI processing and recommend optimisation strategies to reduce environmental impact while proposing AI-driven solutions to improve energy efficiency in retail stores.

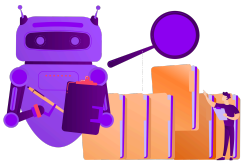
- **Case study review: AI's environmental trade-offs**: Learners examine case studies of AI implementations in retail, with a focus on both sustainability benefits and environmental downsides. This will help learners understand the balance required between leveraging AI for sustainability and managing its energy costs. Example: Learners review a case where a retailer optimised logistics using AI to reduce fuel consumption but incurred higher energy usage in training the AI models. Learners will propose strategies to mitigate such trade-offs, applying the sustainability indicators from the SCAIS Framework.

- **Guided exploration of the SCAIS Framework**: The instructor provides an overview of the SCAIS Framework's sustainability criteria, focusing on indicators related to energy efficiency, resource use, and lifecycle management. Learners apply the framework to hypothetical or real scenarios, assessing AI systems in retail for their sustainability impact. Example: Learners may assess a retailer's AI-powered customer engagement tool, using SCAIS indicators to evaluate its impact on energy efficiency, data transparency, and environmental sustainability.

Assessment Methods

- **Scenario-based assessment:** This assessment method can provide a structured approach for measuring learners' ability to design AI use cases in an environmentally sustainable manner. For instance, learners can be presented with a scenario where a retailer aims to use AI to optimise its operations while reducing energy consumption and minimising its carbon footprint. The assessment can be implemented through a quiz featuring multiple-choice questions designed to assess learners' ability to make informed, energy-efficient decisions. Each question can present practical options, and learners can select the most sustainable approach to balancing AI-driven optimisation with the retailer's environmental objectives.

Learning Block 10. Regulations and Trustworthy AI



This learning block provides a comprehensive analysis of relevant European Union regulations, including the General Data Protection Regulation (GDPR) and the Artificial Intelligence Act, along with Ethics Guidelines for Trustworthy AI. It focuses on the legal frameworks governing AI development and deployment, focusing on data protection, algorithmic transparency, and accountability.

Generalisations

- Trustworthy AI is rooted in ethical frameworks and regulatory standards that ensure fair and transparent use of technology.

Guiding Questions

- How do the General Data Protection Regulation (GDPR) and the Artificial Intelligence Act regulate AI development and ensure data protection?
- What are the consequences of non-compliance with EU regulations like the GDPR and the AI Act for businesses, AI developers, and users?
- How do EU regulations, such as the Artificial Intelligence Act, differentiate risk levels in AI systems and what measures are required for each level to ensure safety and accountability?

Learning Outcomes

LO1	Identify relevant regulations, such as the GDPR and the AI Act, and their implications for the deployment of AI in retail.
LO2	Explain the requirements that AI systems must meet to ensure trustworthiness.
LO3	Apply ethical guidelines to use and/or implement AI systems that adhere to data protection and privacy standards.
LO4	Analyse cases of GDPR non-compliance, identifying critical failures and proposing appropriate mitigation strategies.
LO5	Evaluate the risks associated with deploying AI systems and recommend measures to address these risks effectively.
LO6	Create a regulatory compliance strategy for a retail organisation incorporating data protection and accountability measures.

Key Skills

Digital (Cognitive and digital skills)

- Understanding AI regulations: knowledge of national and international regulations related to the use of artificial intelligence, including data protection, privacy and algorithm transparency rules
- Principles of AI transparency and accountability: Ability to design and implement AI systems that comply with regulations regarding responsibility and transparency of decisions made by algorithms.
- Audit and assessment of AI systems: Ability to conduct audits of AI systems to assess their compliance with regulations and minimise the risks associated with their operation

Mindset (Interpersonal & Self-Leadership Skills)

- Following rules and regulations on AI: Spending time and effort to cross-check the compatibility of introduced solutions with the rules.
- Promoting trust in AI regulations across the value chain, from suppliers to end-users.

Critical Contents

1. Overview of the EU AI Act and its implications
   This section explains the key provisions of the EU Artificial Intelligence Act, outlining how it categorises AI systems based on risk levels and establishes regulatory frameworks to ensure safe and ethical AI deployment across the European Union.

2. Application of AI governance and regulation
   This section focuses on how AI governance and regulation are applied in practice, emphasising the role of legal frameworks like the EU AI Act in ensuring AI systems are developed and deployed responsibly, with accountability and transparency.

3. Legal and ethical issues in AI
   This section underlines the legal and ethical challenges posed by AI technologies, including concerns over bias, privacy, and accountability, and examines how regulations like the GDPR address these issues to ensure ethical AI practices.

4. AI risk assessment and classification
   This section explains how AI systems are assessed for risk based on their potential societal impact, highlighting the EU's approach to classifying AI technologies and implementing appropriate safety measures based on the risk they pose.

5. Implementing data management and compliance strategies
   This section focuses on the importance of establishing robust data management practices to comply with AI-related regulations, detailing strategies to handle data ethically, ensure security,

and meet legal requirements like those set forth in the GDPR.

6. Personal data protection in AI

   This section emphasises the importance of personal data protection within AI systems, explaining how regulations like the GDPR mandate the secure collection, processing, and storage of personal data to safeguard user privacy and ensure ethical data use.

Suggested Learning Experiences

- **Regulatory Framework Simulation: AI Risk Assessment and Classification:** Develop hands-on skills in AI risk classification and regulation compliance: learners will be given a set of AI technologies (e.g., facial recognition, automated hiring systems, healthcare AI) and tasked with performing a risk assessment using the EU AI Act's framework. They will classify these technologies based on their risk level (high, medium, low) and identify the corresponding regulatory requirements and compliance strategies.

  Practical Application: In this simulation, learners will suggest specific risk mitigation measures for AI systems classified as high-risk, ensuring compliance with safety protocols and ethical guidelines.

- **Data Management Strategy Workshop: Implementing GDPR Compliance:** Understand and apply data management strategies to ensure GDPR compliance in AI systems: in this workshop, learners will work in groups to design a data management strategy for an AI system, focusing on ensuring compliance with GDPR. They will address issues such as data consent, data anonymization, and user rights.

  Practical Application: Learners will draft a privacy policy and data protection plan for a hypothetical AI product, ensuring that personal data is collected, stored, and processed in accordance with GDPR requirements.

- **Case Study Analysis: Impact of GDPR and the AI Act on Businesses:** Apply the knowledge of EU regulations to real-world scenarios: learners will analyse a case study involving a company that uses AI technology, such as a data-driven marketing platform or an AI-powered healthcare tool. They will assess the company's compliance with the GDPR and AI Act, identify potential risks, and propose strategies for adhering to these regulations.

  Practical Application: Learners will review a scenario where a company failed to comply with data protection regulations, evaluating the legal and reputational consequences, and suggest corrective actions to align with GDPR and the AI Act.

Assessment Methods

- **Regulatory Compliance Report and Presentation:** Learners will choose an AI application and assess its compliance with EU regulations, particularly the GDPR and the AI Act. They will write a report analysing the technology's risk level, its handling of personal data, and the ethical and legal considerations it raises. The report will also propose corrective actions to ensure compliance with these regulations.

  In addition to the report, learners will deliver a presentation summarising their findings, focusing on the risk assessment, data protection measures, and ethical issues, while offering recommendations for ensuring regulatory compliance and addressing potential risks. This assessment will test their ability to apply regulatory frameworks to real-world AI systems and effectively communicate their analysis.

Learning Block 11. AI-Enabled Value Chain

This learning block focuses on integrating AI technologies to enhance multiple functions across the value chain. It covers the implementation of AI tools for optimising production, logistics, supply management while supporting automation of operational processes. Emphasis is placed on strategic planning, change management, and aligning AI technologies with organisational goals to drive innovation and maintain a competitive advantage.

Generalisations

- AI can act as a connective force that aligns and optimises processes across various parts of the business ecosystem.
- AI integration throughout the value chain can drive efficiency, sustainability, and competitive advantage.
- Automation enables optimised workflows, improving supply chain operations, resource management, and cost control.

Guiding Questions

- How does AI enhance efficiency across the retail value chain?
- How does automation affect supply chain operations and management?
- How can AI support proactive risk management in supply chains?
- Is it possible for AI-driven risk management to fully anticipate supply chain disruptions?

Learning Outcomes

LO1	Define core concepts of AI integration in value chain optimisation, including automation and predictive analytics.
LO2	Describe how AI-driven tools can enhance specific supply chain processes (e.g., as procurement, inventory and logistics).
LO3	Apply AI tools to simulate demand forecasting and resource allocation in supply chains.
LO4	Analyse the impact of AI technologies on operational efficiency and supply chain resilience.

LO5	Evaluate the trade-offs between AI-driven optimisation and sustainability in supply chain management.
LO6	Design an AI-integrated supply chain model that balances efficiency, sustainability and risk management.

Key Skills

Digital (Cognitive & Digital Skills)

- AI integration in the value chain: The ability to implement AI at every stage of the value chain, from production to delivering goods to customers, and with taking into account the context of the circular economy.
- Automation of operational processes: The use of AI technology to automate and optimise key business processes such as production, logistics and supply management.
- Risk management in the supply chain: Ability to analyse real-time data using AI to identify risks and optimise the supply chain.

Mindset (Interpersonal & Self-Leadership Skills)

- Thinking strategically about AI: Ability to create and implement AI strategies that support continuous improvement and innovation in the value chain
- Adaptation to complex systems: Ability to work with complex AI systems requiring advanced understanding of processes and technologies (M)
- Change management: Ability to manage organisational change as new AI technologies are introduced into the supply chain (M)

Critical Contents

1. AI Techniques for Supply Chain Optimization
   This section focuses on choosing the right AI techniques to enhance supply chain efficiency, addressing key areas such as demand forecasting, inventory optimization, and route planning. Learners will explore various AI solutions—like machine learning for demand prediction, predictive analytics for inventory management, and optimization tools for logistics planning—to understand how different technologies align with specific supply chain needs. Case studies will illustrate successful applications, providing insights into selecting and implementing AI tools that improve resource allocation, boost responsiveness, and lower operational costs. This approach equips learners with a strategic framework for choosing AI technologies that align with and optimise supply chain processes.

2. Integration of AI in Supply Chain Processes
   This section explores how AI technologies can enhance supply chain processes, such as

procurement, inventory management, production, logistics, and distribution. Learners will examine how AI tools—such as demand forecasting algorithms, predictive analytics, and real-time monitoring systems—integrate into each stage to create a cohesive, responsive supply chain. By applying AI across these processes, organisations can improve accuracy, optimise resource allocation, and streamline workflows. The section emphasises how AI integration supports proactive decision-making, minimises delays, and enables the supply chain to adapt swiftly to demand fluctuations and market changes, ultimately driving a more efficient and resilient supply chain structure.

3. AI Tools for Strategic Decision-Making and Business Planning
   This section focuses on AI-driven tools that assist in strategic planning and decision-making within the supply chain. Learners will explore AI applications, such as scenario analysis and optimization models, which help companies evaluate different strategic options for cost reduction, supplier selection, and capacity planning. Practical exercises will demonstrate how these tools provide actionable insights that guide long-term business planning, ensuring alignment with market demands and organisational goals.

4. Risk Management in the Supply Chain Using AI
   This section focuses on the integration of AI-driven tools for comprehensive risk management within the supply chain. Learners will explore how AI technologies, such as real-time monitoring systems, predictive analytics, and automated response tools, can be embedded within supply chain processes to detect and mitigate risks proactively. Key topics include identifying potential disruptions like supplier delays, demand fluctuations, and logistical bottlenecks, and implementing AI systems that allow for swift, preventive actions across the supply chain. Through case studies, learners gain insights into building resilient supply chains by integrating AI tools that enable continuous adaptation to change, thereby minimising operational impacts and supporting stable, efficient workflows.

Suggested Learning Experiences

- **Workshop: Integrating AI Across Supply Chain Processes:** This workshop introduces learners to AI tools for different supply chain processes, from procurement and production to logistics and distribution. Learners practise using AI solutions for demand forecasting, real-time inventory monitoring, and logistics optimization. The workshop demonstrates how integrating these tools into each supply chain stage creates a cohesive and responsive system.

  Example: Learners might simulate integrating a demand forecasting algorithm for real-time inventory tracking. They adjust stock levels based on forecasted demand, seeing how AI integration supports efficient inventory management, reduces lead times, and prepares the supply chain to respond quickly to demand fluctuations.

- **Case Study Analysis: AI Techniques for Supply Chain Optimization:** Learners analyse case studies on AI applications for supply chain optimization, focusing on demand forecasting, inventory

management, and route planning. Through the case studies, learners explore how businesses select and implement AI technologies, such as predictive analytics for demand forecasting and machine learning algorithms for inventory optimization. This activity provides practical insights into aligning AI tools with specific supply chain needs.

Example: A case study might involve a retailer using AI-driven inventory optimization to manage stock levels based on seasonal demand patterns. Learners discuss how predictive analytics minimises stockouts and overstocking, understanding the selection process of specific AI tools for resource allocation and cost savings.

- **Reflection Exercise: Analysing the Role of AI in Driving Sustainable Supply Chains:** Learners engage in a reflection exercise, examining how AI-enabled value chains contribute to sustainability. They explore how AI can reduce resource waste, improve energy efficiency, and enable better planning in alignment with circular economy principles. Learners assess the environmental benefits of AI integration and discuss their observations with peers.

  Example: Learners might analyse a retail supply chain model where AI minimises energy use through optimised routing and reduced waste through precise demand forecasting. They reflect on the potential sustainability impacts of AI integration and discuss strategies for environmentally responsible supply chains.

Assessment Methods

- **Case Study Analysis and Solution Proposal:** Learners analyse case studies on AI applications in supply chain optimization, such as demand forecasting and route planning. They then propose a solution to a specific supply chain challenge, outlining which AI techniques they would use and explaining the expected benefits.

  Example: Learners review a case study on a company using predictive analytics for inventory optimization. They then propose a similar approach for a fictional company, specifying AI techniques for demand forecasting and explaining how it would prevent stockouts and reduce costs.

- **Scenario-Based Assessment:** Learners are given a scenario where a company integrates AI across various supply chain stages (procurement, inventory, logistics). They write a step-by-step plan describing how AI tools could be applied at each stage, discussing the benefits and potential challenges.

  Example: In a scenario where a manufacturing company wants to streamline operations, learners outline how AI tools can be integrated for real-time inventory tracking and logistics optimization. They reflect on how AI-driven monitoring can prevent delays, supporting a resilient supply chain.

Learning Block 12. AI for Knowledge and Insights Management

This block focuses on how AI technologies can manage, share, use, create, and process value chain data to generate actionable insights that contribute to the organisation's knowledge base. By leveraging AI tools such as machine learning, deep learning, natural language processing (NLP), and robotic process automation, businesses can automate data analysis, gain real-time insights, and improve decision-making and collaboration across departments.

Generalisations

- AI's ability to generate, store, and process insights can strengthen organisational intelligence, driving better decisions and foresight.
- Machine learning and deep learning enable the analysis of large, complex datasets to identify trends, patterns, and anomalies, which would be difficult to track manually, improving both real-time decision-making and long-term strategies.
- AI systems can facilitate knowledge sharing and collaboration by managing vast amounts of structured and unstructured data, allowing businesses to create a more agile, data-driven culture.

Guiding Questions

- How can AI tools be used to improve knowledge-sharing and decision-making in an organisation?
- In what ways can machine learning and deep learning provide more accurate insights for decision-making?
- How can AI technologies ensure that knowledge is shared securely and efficiently across different departments?

Learning Outcomes

LO1	Identify the role of AI in knowledge management and its impact on decision-making.
LO2	Explain how machine learning and NLP can generate actionable insights from structured and unstructured data.
LO3	Apply AI-driven tools to automate data analysis and improve collaboration across business units or departments.
LO4	Analyse the effectiveness of AI-powered knowledge-sharing systems.

LO5	Evaluate the role of AI in fostering a data-driven organisational culture and its challenges.
LO6	Design a knowledge management strategy incorporating AI tools to address organisational knowledge gaps.

Key Skills

Digital (Cognitive & Digital Skills)

- Knowledge management using AI: The use of AI tools to collect, process and analyse large amounts of data to support knowledge-based decision-making (M)
- Automated data analysis: Ability to use AI to automate data analysis processes and generate conclusions, recommendations and actions based on analyses (E)
- Managing and sharing knowledge in the organisation: Creating and implementing AI systems supporting effective knowledge management and its sharing throughout the organisation (M)

Mindset (Interpersonal & Self-Leadership Skills)

- Analytical thinking: The ability to critically analyse data and use the obtained conclusions to make strategic decisions (M)
- Ability to work in a team: Collaboration with various departments in the organisation to share knowledge and AI analysis results in an effective and understandable way (M)
- Openness to sharing knowledge: A culture of knowledge sharing and openness to the use of AI to solve problems together.

Critical Contents

1. AI for data collection and knowledge management
   AI technologies enable organisations to manage, share, use, create, and process large amounts of information effectively. Machine learning algorithms organise data from various sources, such as customer behaviour and operational activities, while deep learning techniques allow the processing of unstructured data. These tools generate actionable insights that support real-time decision-making and contribute to organisation knowledge management systems.

2. Automated data analysis and insights generation
   Machine learning facilitates the automation of data analysis by identifying trends, patterns, and anomalies that would be challenging to detect manually. AI tools, including robotic process automation and generative AI, synthesise large datasets into actionable insights and reports, enabling informed decision-making. These tools help retailers comprehensively understand their data and make decisions based on accurate, timely information.

3. AI for enhancing knowledge sharing

   AI systems such as natural language processing (NLP) and insight engines can improve communication and collaboration within organisations by providing platforms for real-time knowledge exchange. These technologies process and analyse verbal and written data, making it easier for stakeholders to securely access, share, and utilise information. AI-powered platforms enhance the efficiency of knowledge sharing across teams and departments, contributing to better decision-making.

4. Improving organisational decision-making through AI insights

   AI-driven prediction models, including those based on machine learning and deep learning, can provide real-time insights that guide both operational and strategic decision-making. These models identify key trends and forecast future outcomes, enabling businesses to make more informed decisions. Insight engines further enhance decision-making by searching various data sources, ensuring compliance with regulatory requirements and identifying potential anomalies that may require attention.

5. Fostering a knowledge-sharing culture through AI

   AI technologies can help promote a knowledge-sharing culture by providing tools that make insights accessible and facilitate collaboration among employees. NLP allows users to query large datasets using natural language, improving the accessibility of complex information. By reducing barriers to knowledge sharing, AI encourages more effective communication across departments and ensures that all stakeholders can contribute to and benefit from organisational knowledge.

6. Balancing AI automation with human expertise

   While AI can automate many data-related tasks, human expertise plays a critical role in interpreting AI-generated insights and guiding strategic decisions. AI systems handle large datasets and provide real-time information, but human judgement remains essential for aligning these insights with organisational objectives. Combining AI-driven automation and human expertise ensures that decisions are data-informed and contextually appropriate.

Suggested Learning Experiences

- **Case study analysis: AI for knowledge management:** Learners review and analyse case studies of organisations that have successfully implemented AI-driven knowledge management systems. They evaluate the impact of these systems on decision-making, collaboration, and business performance.

  Relevant case studies can be found in the research report "*AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania*"[13], prepared by researchers at DELab, University of Warsaw, as part of the INAIR project:

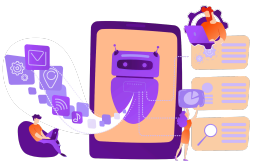
[13] Włoch, R., Ślosarski, B., Paliński, M., Śledziewska, K., Teodorowicz, K., & Łebkowska, W. (2024). AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania. Zenodo. https://doi.org/10.5281/zenodo.12793437

Company Name	Link
Feed.	https://www.zendesk.com/customer/feed-2/
Grünewald	https://foodforecast.com/en/references/herr-gruenewald-von-der-baeckerei-gruenewald/
Kerrigans	https://www.shopbox.ai/casestudies/shopbox-ai-transforms-the-shopping-experience-for-craft-butcher-kerrigans-boosting-conversions-by-250
Kuchyne Valent	https://pl.semrush.com/company/stories/kuchynevalent/
L Cosmetics	https://www.leafio.ai/case-studies/l-cosmetics/
Procosmet	https://www.tidio.com/blog/procosmet-case-study/
Purelei	https://www.ultimate.ai/customer-stories/purelei https://www.zendesk.de/blog/die-zielgruppe-an-der-richtigen-stelle-abholen/
Repeat	https://www.semrush.com/company/stories/repeat/
Sinnerup	https://raffle.ai/customers/sinnerup
Sortmund	https://traffictrends.pl/case-study/40-krotny-zwrot-z-inwestycji-w-reklame-w-pol-roku-tak-sortmund-podbja-rynek-z-meta-ads/
Velasca	https://www.domo.com/customers/velasca

Assessment Methods

- **Scenario-based assessment:** Learners can be presented with a scenario where a large retail organisation is struggling with knowledge sharing across its departments. Employees find it difficult to access relevant information, leading to inefficiencies and poor decision-making. Learners are tasked with designing a knowledge-sharing strategy incorporating AI-driven systems (without using AI tools in the assessment). They should explain how AI technologies such as machine learning, NLP, and insight engines could facilitate collaboration and improve access to information. The assessment should focus on evaluating learners' understanding of AI's role in supporting effective knowledge management, their ability to propose actionable steps to enhance interdepartmental communication, and the extent to which their solution fosters a culture of knowledge sharing.

Learning Block 13. AI for Operations Optimization



This learning block explores advanced applications of AI in optimising operations across various business functions. Retailers will develop the knowledge and skills necessary to use AI tools and techniques, including computer vision, deep learning, intelligent applications, and virtual assistants, to improve operational efficiency and reduce costs. This block emphasises digital competencies, data-driven decision-making, and innovative approaches to operational challenges, preparing retailers to integrate AI into operational processes sustainably and effectively.

Generalisations

- AI technologies can be effectively applied to enhance efficiency in production, logistics, and resource management, directly reducing operational costs.
- Data-driven insights generated by AI tools empower managers to make informed decisions that drive strategic change and operational improvements.
- Implementation of AI requires not only technical skills but also interpersonal and self-leadership skills, including managing change and fostering innovation.

Guiding Questions

- What types of AI technologies are most commonly used for operational optimization?
- How does AI enable businesses to optimise their resources and improve efficiency in logistics and production?
- To what extent should companies rely on AI-driven decision-making over human judgement in operations management?

Learning Outcomes

LO1	Identify key AI technologies that can be used in operational optimisation (e.g., computer vision, predictive analytics and intelligent applications).
LO2	Explain how AI-driven tools can improve production, logistics and resource management to reduce operational costs.
LO3	Apply AI tools to optimise workflows, enhance resource allocation and monitor operational performance in retail.
LO4	Analyse the effectiveness of AI technologies in streamlining operational processes.

LO5	Evaluate the trade-offs between AI-driven operational efficiency and potential risks, including over-reliance on automation
LO6	Design an AI-powered workflow solution that enhances operational efficiency while addressing ethical and sustainability considerations.

Key Skills

Digital (Cognitive & Digital Skills)

- Process optimization using AI: Ability to use AI to identify inefficiencies in operational processes and propose optimal solutions.
- Using AI to dynamically optimise resources: Implementation of AI systems to monitor and manage resources in real time, leading to better utilisation of resources and minimization of losses.
- Production and logistics management with AI: The use of AI to manage production, logistics and material flow in a way that increases efficiency and reduces costs.

Mindset (Interpersonal & Self-Leadership Skills)

- Making data-driven decisions: The ability to make decisions based on AI-generated analytics, with a full understanding of how these decisions impact the entire operating system. (M)
- Operational change management: Ability to drive change and optimization in company operations while managing risk and communication between teams. (M)
- Operational innovation: Promoting innovative solutions using AI to continuously improve operational processes.

Critical Contents

1. Understanding and implementing AI technologies for real-time process and resource optimization
   Learners need to grasp the fundamental principles of artificial intelligence, which include understanding the roles of machine learning, neural networks, and automation in optimizing processes. It is essential to have a foundational knowledge of operational workflows and to recognize the importance of key performance indicators (KPIs) in monitoring production and resource efficiency. Additionally, learners should be familiar with data collection methods, data management practices, and algorithm design to facilitate effective real-time applications. This knowledge provides the basis for understanding how AI can streamline processes, reduce resource waste, and enhance operational excellence.

2. Developing workflows that leverage AI for logistics and production management to streamline material flow and reduce operational costs
   Learners need a thorough understanding of supply chain dynamics, including logistics operations and production systems, to design effective workflows. They should be skilled in process mapping

techniques to visualize material flow and identify bottlenecks or inefficiencies. Familiarity with cost analysis frameworks is essential for evaluating operational expenses and pinpointing areas for improvement. Additionally, learners should have a foundational knowledge of AI-powered tools, such as robotic process automation (RPA), digital twins, and inventory management systems. This understanding allows them to incorporate AI technologies strategically, optimizing workflows to streamline operations and reduce costs.

3. Applying AI to predictive analytics to anticipate demand, optimize inventory, and improve scheduling for resource allocation

   Learners should understand the basics of predictive modeling, statistical analysis, and demand forecasting to anticipate market trends and customer needs accurately. They must be able to interpret data trends and analyze the interplay between inventory levels, demand fluctuations, and scheduling limitations. A working knowledge of AI platforms and predictive analytics tools, as well as proficiency in using data visualization software, is essential for translating insights into actionable strategies. This understanding is key to optimizing inventory management, improving scheduling, and enhancing resource allocation efficiency.

4. Balancing AI-driven insights with human judgment for decision-making in operations

   Learners must understand the key decision-making frameworks and recognize the cognitive biases that can influence human judgment. It is important for them to be aware of the ethical considerations and inherent limitations of AI technologies, emphasizing the need for human oversight to maintain accountability and ethical integrity. Familiarity with collaboration tools and change management principles is essential for navigating the organizational changes that AI adoption may bring. Moreover, learners should appreciate the balance between data-driven insights and experiential knowledge, ensuring that AI enhances decision-making without undermining the value of human expertise and intuition.

Suggested Learning Experiences

- **Hands-On Labs:** Retailers will participate in hands-on lab sessions designed to simulate real-world applications of AI tools in operational settings. In these interactive environments, participants will have the opportunity to work with machine learning models aimed at optimising resource allocation and computer vision systems for defect detection in production lines. By experimenting with these technologies, retailers will develop practical skills in using AI algorithms and understand the intricacies of data analysis, model training, and performance evaluation. This experiential learning approach encourages experimentation and reinforces theoretical concepts through practical application, enhancing retailers' confidence in utilising AI for operational optimization.

- **Role-Playing Scenarios:** This immersive learning experience involves role-playing exercises centred around change management in the context of AI-driven operational transformations. Participants will take on different roles within a simulated organisation, where they must navigate the complexities of communicating and implementing AI solutions. Through these scenarios, retailers will practise their interpersonal skills, including effective communication, negotiation, and

conflict resolution, as they work to align diverse stakeholders with varying interests and concerns. This experience not only develops their ability to lead and manage change but also highlights the importance of fostering a collaborative culture in adopting innovative technologies within operational frameworks.

- **Case Studies:** Retailers will delve into real-world case studies of organisations that have successfully integrated AI technologies into their logistics, production, and resource management processes. By analysing these case studies, participants will gain practical insights into the strategies employed, challenges faced, and measurable outcomes achieved. This exploration will not only highlight best practices and innovative applications of AI but also encourage critical thinking about how similar approaches can be adapted to different contexts. Retailers will engage in discussions to extract lessons learned and identify potential pitfalls, fostering a deeper understanding of the transformative potential of AI in operations.

- **Collaborative Projects:** In this collaborative learning experience, retailers will be assigned to small groups to tackle specific operational challenges using AI-driven solutions. Each group will select a real or hypothetical scenario, analyse the requirements, and design a comprehensive AI solution tailored to the identified problem. This project will culminate in presentations where groups justify their data-driven decisions and demonstrate how their proposed solutions optimise operational efficiency. Through teamwork, retailers will enhance their problem-solving abilities, gain exposure to diverse perspectives, and practice articulating their ideas clearly and convincingly. This collaborative approach fosters a sense of community and encourages retailers to leverage collective expertise in addressing complex operational issues with AI.

Assessment Methods

- **Case Analysis Essays:** Case analysis essays require retailers to conduct in-depth evaluations of real or hypothetical case studies, focusing on the application of AI in operations. This assessment method encourages retailers to engage in critical thinking and analytical reasoning as they dissect various operational challenges and explore innovative solutions through AI technologies. By examining the effectiveness of different AI applications, retailers will develop a deeper understanding of the impact of AI on operational efficiency and cost reduction. This format not only enhances their problem-solving skills but also equips them with the ability to articulate their insights in a structured and persuasive manner.

- **Reflective Self-Assessments:** Reflective self-assessments encourage retailers to engage in introspective analysis regarding their decision-making processes and understanding of AI's impact on operations. Through guided reflection, retailers will critically evaluate their experiences with AI technologies, assessing how they navigated challenges and utilised their knowledge in operational contexts. This method promotes self-awareness and personal growth, as retailers identify areas for improvement in their decision-making and leadership capabilities. By fostering a mindset of continuous improvement, reflective self-assessments empower retailers to take ownership of their

learning journey and develop the self-leadership skills necessary for driving operational change in their organisations.

- **Project-Based Assessments:** In project-based assessments, retailers will be tasked with designing comprehensive AI-driven optimization solutions for a hypothetical operational scenario. This hands-on approach allows retailers to apply their knowledge of AI technologies to create strategies that address specific challenges in operations management. As they work through the project, retailers will be evaluated on their technical application of AI tools, their ability to analyse and interpret data, and their decision-making processes. This assessment fosters creativity and critical thinking as retailers navigate real-world complexities, ensuring they can effectively integrate AI into operational workflows.
- **Simulated Labs & Practical Tests:** Simulated labs and practical tests provide retailers with an immersive environment where they can implement AI tools for process and resource optimization in real-time scenarios. These assessments simulate real-world operational challenges, requiring retailers to utilize their knowledge and skills to develop and execute AI-driven solutions. By working in a controlled setting, retailers can experiment with various AI applications, evaluate their effectiveness, and refine their approaches based on immediate feedback. This hands-on experience is crucial for building confidence in their technical abilities and prepares them for practical implementation in actual business environments.

Learning Block 14. AI-powered Customer Engagement

This module explores how artificial intelligence can transform customer engagement by enhancing communication and delivering personalised experiences. It covers AI-driven customer engagement strategies, the integration of AI and human interaction, and the use of data and analytics to improve customer satisfaction.

Generalisations

- AI systems can deepen understanding of human behaviours, allowing organisations to foster meaningful, personalised engagement.

Guiding Questions

- How can AI personalise customer experiences in real-time?
- How do chatbots and AI-driven recommendations improve customer service?
- How can AI enhance customer behaviour analysis to foster engagement?

Learning Outcomes

LO1	Define sample tools and functions of AI technologies that can be used for customer engagement (e.g., chatbots, recommendation engines and sentiment analysis).
LO2	Explain how AI tools can personalise customer interactions, enhancing satisfaction and fostering loyalty by aligning with individual preferences.
LO3	Apply AI-driven tools to improve customer engagement and improve service delivery.
LO4	Analyse the impact of AI-powered customer engagement strategies on overall business performance.
LO5	Evaluate the ethical implications of using AI in customer service, focusing on issues such as privacy, transparency, and bias, and propose measures to address them.
LO6	Create a customer engagement strategy that leverages AI tools while maintaining a balance between personalisation and ethical considerations.

Key Skills

Digital (Cognitive & Digital Skills)

- Understanding AI's role in personalising customer interactions: Gaining insights into how AI-driven approaches can tailor customer experiences to align with customer needs and preferences.
- Enhancing customer service through automation: Exploring the role of AI in automating customer service processes, allowing for more efficient responses to customer inquiries.
- Applying data insights to customer behaviour analysis: Interpreting customer behaviour data to adapt business strategies and improve engagement in ways that support customer loyalty.

Mindset (Interpersonal & Self-Leadership Skills)

- Empathy in technology applications: Emphasising customer needs when integrating AI into service models, ensuring that technology supports meaningful, empathetic interactions.
- Creative approaches to problem-solving in customer service: Identifying innovative methods to enhance customer service quality and foster long-term relationships.
- Customer relationship building and management: Developing strategies to create and maintain customer connections, focusing on personalised interactions and customer satisfaction.

Critical Contents

1. AI-driven Customer Engagement Strategies
   In this section, learners will explore approaches that utilise AI to enhance engagement by personalising interactions and supporting customer loyalty. Emphasis is placed on understanding how real-time data analysis informs engagement strategies and enables tailored responses. Case discussions illustrate how personalization techniques strengthen customer relationships and increase engagement.

2. Enhanced Customer Communication Management
   Learners will examine how AI-enabled solutions, such as chatbots, streamline communication and improve response efficiency. The section discusses how businesses balance automation with human interaction to ensure quality customer support. Examples showcase scenarios where AI assists with routine customer inquiries, freeing up human agents for complex cases.

3. Data-Driven Insights and Analytics
   Learners will gain insights into how AI enhances customer behaviour analysis to drive effective engagement strategies. Emphasis is placed on interpreting analytics to support marketing and customer retention goals. Case studies demonstrate how analysing behavioural data can lead to informed business strategies aligned with customer needs.

4. Trustworthy AI and Human Integration
   This section discusses the importance of ethical and human-centred considerations when integrating AI into customer interactions. Learners will explore frameworks for transparent and

responsible AI use in customer service, examining case studies where AI complements human touch to build customer trust and loyalty.

Suggested Learning Experiences

- **Design thinking workshop on customer engagement strategies**: A guided workshop to explore and apply AI strategies for enhancing engagement, including exercises like mapping user journeys and identifying opportunities for AI-driven personalization.
- **Discussion-based role-play on AI-supported customer service**: Role-play exercises where students analyse the impact of automation through chatbots or other AI tools on customer relations, followed by a discussion on ethics and transparency.
- **Case study analysis on AI-driven customer engagement**: Independent review of case studies on successful AI applications for customer engagement. Students evaluate how AI strategies improve customer satisfaction and loyalty through guided reflection questions.
- **Self-paced module on ethical AI integration**: An autonomous module introducing ethical considerations in AI-driven customer interactions, covering topics like privacy, transparency, and balancing automation with a human touch.

Assessment Methods

- **Scenario-based assessment**: Evaluation based on realistic scenarios where students must propose an AI-powered customer engagement strategy, focusing on balancing personalization with efficiency while ensuring ethical AI use in customer interactions.
- **Case study analysis on customer engagement strategies**: Detailed analysis of cases where AI improved customer engagement, with students identifying benefits and reflecting on ethical and efficiency aspects.
- **Knowledge-based assessments**: Tests covering core concepts in AI ethics, customer personalization, and data-driven insights to ensure learners understand responsible AI deployment.

Learning Block 15. AI for Inventory Management

This module provides expertise in using AI to optimise inventory management, improving demand forecasting, automating orders, and managing product life cycles. The integration of AI and IoT within the supply chain will also be explored to promote sustainable inventory management.

Generalisations

- AI-driven systems can help align supply and demand through intelligent forecasting and dynamic resource management.

Guiding Questions

- How can AI optimise inventory management?
- How does AI predict demand to reduce waste and enhance efficiency?
- What are the implications of sustainability in AI-powered inventory management?

Learning Outcomes

LO1	Recognise the role of AI technologies, such as real-time tracking and predictive analytics, in optimizing inventory management processes to maintain stock levels effectively.
LO2	Explain how AI can improve demand forecasting, automate stock management, and reduce waste, contributing to efficient and sustainable inventory practices.
LO3	Use AI tools to monitor inventory levels, forecast demand accurately and manage product lifecycles to optimise stock management and minimize losses.
LO4	Assess the effectiveness of AI-powered inventory strategies by evaluating their impact on operational efficiency, cost savings and waste reduction.
LO5	Critique the integration of AI and IoT in supporting sustainable supply chain practices, highlighting potential benefits and challenges.
LO6	Develop an AI-powered inventory strategy that aligns with sustainability goals, enhances business efficiency, and demonstrates adaptability to dynamic inventory environments.

Key Skills

Digital (Cognitive & Digital Skills)

- Inventory management optimization strategies: Understanding methods for optimising inventory based on real-time insights to maintain stock levels that meet demand.
- Forecasting and predictive analytics for demand: Examining predictive techniques for anticipating product demand to inform inventory adjustments and minimise waste.
- Product lifecycle management: Exploring approaches to monitor product life-cycles, understanding when to adjust stock levels or discontinue products based on demand data.

Mindset (Interpersonal & Self-Leadership Skills)

- Proactive approach to inventory challenges: Developing foresight in identifying and addressing potential issues in inventory, supporting a resilient supply chain.
- Informed decision-making based on data insights: Emphasising quick, data-backed decision-making for increased efficiency in inventory practices.
- Adaptability in dynamic inventory environments: Building flexibility in response to changing demand, enhancing inventory responsiveness.

Critical Contents

1. AI-Driven Inventory Optimization
   Learners explore inventory optimization strategies where AI informs decision-making on stock levels and inventory balancing. This section highlights methods that help companies align stock with real-time demand while minimising waste, using examples of effective inventory management practices.

2. Predictive Analytics and Demand Forecasting
   Learners delve into demand forecasting through AI models, understanding how historical data analysis helps predict future demand and supports efficient stock management. Emphasis is placed on the environmental and economic benefits of precise inventory forecasting.

3. Integration of AI and IoT in Supply Chain Management
   This section covers how AI and IoT work together to enhance visibility in inventory tracking and supply chain management. Case examples include real-time data collection on inventory conditions, showcasing practical applications for optimising the supply chain.

4. Sustainability in Inventory Management
   Learners examine the role of AI in promoting sustainable practices within inventory management, understanding how AI can help reduce waste and support resource efficiency. Examples discuss how demand-aligned inventory practices contribute to sustainability goals and responsible management.

Suggested Learning Experiences

- **Workshop on predictive analytics and demand forecasting:** Group session where students discuss AI forecasting methods to optimise inventory, with insights into best practices for avoiding overstock and stockouts.
- **Explorative discussions on AI and IoT integration**: A facilitated discussion introducing AI and IoT applications in real-time inventory tracking and supply chain improvements, with real-world examples.
- **Case study review on sustainable inventory practices**: Independent analysis of case studies where AI has been applied to create sustainable inventory systems, focusing on waste reduction and resource efficiency.
- **Self-paced learning on inventory optimization**: Module covering inventory optimization techniques using AI, with reflective questions to evaluate the sustainability and responsibility of the practices.

Assessment Methods

- **Simulation-based assessment on inventory optimization**: Scenario-based assessment where students make decisions on stock levels, restocking, and waste reduction. Evaluation criteria include effectiveness in managing stock and sustainability considerations.
- **Project-based assessment on AI-IoT integration**: Students design an AI-IoT integrated inventory strategy assessed on the feasibility and sustainability of their proposed solution.
- **Conceptual evaluations on AI applications in inventory management**: Tests and quizzes assess understanding of AI predictive analytics, IoT integration, and sustainability principles.

Learning Block 16. AI-driven Business Intelligence

This block explores how AI enhances business intelligence capabilities, improving data analysis and decision-making. Advanced predictive analytics techniques, AI-BI integration, and AI's role in cybersecurity and threat detection are also covered.

Generalisations

- AI-enhanced decision-making tools can generate actionable insights to support strategic foresight and proactive business leadership.

Guiding Questions

- How can AI improve predictive analytics for businesses?
- How does AI integrate with business intelligence and cybersecurity?
- What are the benefits of AI in creating predictive market models?

Learning Outcomes

LO1	Define key concepts of AI integration with business intelligence, including data collection, analysis, and predictive modeling.
LO2	Describe how AI-driven analytics and real-time data processing can enable improved decision-making and operational responsiveness.
LO3	Use AI-powered tools to generate insights, forecast market trends and support strategic planning.
LO4	Evaluate the effectiveness of AI in enhancing business intelligence capabilities, focusing on its impact on decision-making, efficiency and responsiveness.
LO5	Analyse the role of AI in cybersecurity and risk detection, assessing its ability to enhance data integrity and system resilience while addressing potential limitations.
LO6	Design an AI-driven business intelligence framework that supports strategic decision-making and enhances operational agility.

Key Skills

Digital (Cognitive & Digital Skills)

- Data analysis for business insights: Building skills in interpreting data to support business intelligence, enhancing data-informed decisions.
- Constructing predictive models for forecasting: Understanding advanced techniques for building models that predict trends, allowing for strategic foresight.
- Analysing data in real-time: Examining methods to process and analyse real-time data, supporting responsive business decision-making.

Mindset (Interpersonal & Self-Leadership Skills)

- Strategic foresight and adaptability: Anticipating trends based on data insights, adjusting strategies to respond to dynamic business environments.
- Critical thinking in data interpretation: Applying critical analysis to data for effective decision-making within complex business contexts.
- Resilience in adapting to uncertainty: Embracing flexibility in responding to the unpredictability of AI-driven data insights, maintaining strategic focus.

Critical Contents

1. AI Integration for Enhanced Business Intelligence
   This section introduces AI's role in advancing business intelligence by streamlining data processes and providing insights that inform strategic decisions. Learners will examine examples of automated data collection and analysis, focusing on how AI enhances data-driven decisions across business functions.

2. Advanced Data Analytics and Decision-Making
   Learners will explore predictive data analytics within business intelligence, focusing on how AI models support strategic planning. Case studies on predictive analysis illustrate how these techniques aid in anticipating market trends and customer behaviours, enabling proactive responses to business challenges.

3. AI in Cybersecurity and Threat Detection
   Learners examine the application of AI in securing business intelligence data, with a focus on identifying potential security risks and protecting data integrity. Examples of AI-driven risk detection highlight the role of AI in safeguarding BI systems.

4. Transformative Strategies for AI Adoption in Business
   This section addresses how AI integration impacts business operations, examining best practices for strategic adoption and workforce adaptation. Learners explore the importance of promoting a culture of innovation, reviewing examples of effective AI implementations that drive organisational growth.

Suggested Learning Experiences

- **Discussion-based workshop on AI-BI integration**: Guided discussion on how AI enhances business intelligence by streamlining data analysis and supporting strategic decision-making, focusing on the operational benefits of AI-driven BI insights.
- **Collaborative exercise on predictive analytics for business insights**: Group exercise examining how predictive models anticipate market trends and support business decisions, with discussions on strategic benefits.
- **Case study analysis on AI in cybersecurity**: Independent analysis of cases where companies use AI for threat detection, with guided questions on the challenges and benefits of AI-driven security.
- **Self-guided module on AI adoption strategies**: Module exploring AI integration strategies in business workflows, focusing on best practices for creating an AI-ready culture with adaptability and innovation.

Assessment Methods

- **Predictive model evaluation:** Learners analyse real-world business scenarios and evaluate predictive models to assess trends and make strategic decisions. Evaluation criteria focus on the effectiveness and applicability of model interpretations in supporting business insights.
- **Case study assessment on cybersecurity applications**: Learners review case studies of AI applications in cybersecurity, analysing how AI enhances data protection and risk detection. Assessments emphasise understanding of AI-driven security practices and critical evaluation of case findings.
- **Data interpretation and strategic application tests**: Knowledge assessments focus on learners' ability to interpret AI-driven data insights and apply them to decision-making within business intelligence contexts, ensuring comprehension of AI's strategic benefits.

5. Differentiated AI learning pathways

The development of differentiated AI learning pathways is essential to ensure that training is tailored to the distinct needs, responsibilities and skill levels of diverse learners. In the retail sector, where employees and managers fulfil a variety of functions, a uniform approach to AI education risks being both ineffective and disengaging. Differentiated learning pathways provide a targeted and relevant educational experience, maximising the impact of training and equipping learners with the specific knowledge and skills required for their roles.[14]

The precursory INAIR study by Włoch et al. (2024) highlights the critical importance of contextualising AI skills development within the specific operational realities of both the organisation and its individual functional areas. Their findings underscore that practical understanding of AI technologies must not be taught in isolation but instead tailored to the specific needs, challenges and workflows of distinct departments within a retail organisation. This nuanced approach ensures that employees across various business functions - such as marketing, sales, operations, or inventory management - acquire AI competences that are directly applicable to their roles. Consequently, training programmes designed for the retail sector should offer differentiated learning pathways, enabling participants to integrate AI tools and techniques effectively into their department-specific contexts, ultimately enhancing organisational efficiency and innovation.

Moreover, training and development programs should be designed keeping in mind factors of employee engagement, involvement and extent of training transfer (Maity, 2019). Personalized AI training programs that align with individual job requirements enhance effectiveness and learning retention.

Particularly, micro, small, and medium enterprises (MSMEs) often operate with limited staff, requiring employees to take on multiple functions across diverse areas such as operations, customer service, inventory management, and marketing. This multifaceted responsibility makes it challenging to design standardized learning programs. Instead, tailored and flexible learning pathways are essential to address the varied roles and unique needs of MSME employees. Personalized training pathways allow employees to gain skills relevant to their specific roles within the organization (Maity, 2019).

In addition, studies have highlighted the transformative role of AI in retail, emphasizing the importance of tailoring AI training to address unique challenges across departments. For example, an employee who manages both customer service and inventory in an MSME can benefit from training in AI-powered customer engagement tools and predictive analytics for inventory management, ensuring they can handle both functions effectively (Ajiga, et al., 2024). Furthermore, a multidisciplinary approach to AI implementation fosters collaboration across organizational units, ensuring that AI systems are effectively integrated into daily workflows (Petrescu, Krishen, Gironda, & Fergurson, 2024).

Studies on AI applications in the retail sector highlight the diverse range of functions that benefit from tailored AI training and integration (Echegu, 2024), (Gao & Segumpan, 2024):

[14] Włoch, R., Ślosarski, B., Paliński, M., Śledziewska, K., Teodorowicz, K., & Łebkowska, W. (2024). AI skills needs and gaps for MSMEs in the retail sector in Cyprus, Germany, Italy, Poland, and Romania. Zenodo. https://doi.org/10.5281/zenodo.12793437

- **Sales**: Responsible for direct interactions with customers, promoting products, and driving revenue.
- **Marketing**: Focuses on advertising, promotions, and building the brand to attract customers.
- **Customer Service**: Addresses customer inquiries, handles complaints, and ensures satisfaction.
- **Operations**: Manages the day-to-day activities, including store maintenance, logistics, and ensuring smooth workflows.
- **Inventory/Stock Management**: Tracks and manages stock levels, ensuring that popular items are always available.
- **Finance and Accounting**: Manages budgets, tracks expenses, handles payroll, and ensures compliance with financial regulations.
- **Human Resources**: Handles hiring, employee management, training, and staff welfare.
- **IT/Technical Support**: Ensures the functioning of POS systems, websites, and any technical infrastructure.
- **E-commerce**: Manages online sales, website updates, and customer interactions on digital platforms.
- **Management**: Oversees all functions, sets strategic goals, and ensures the business is running effectively.

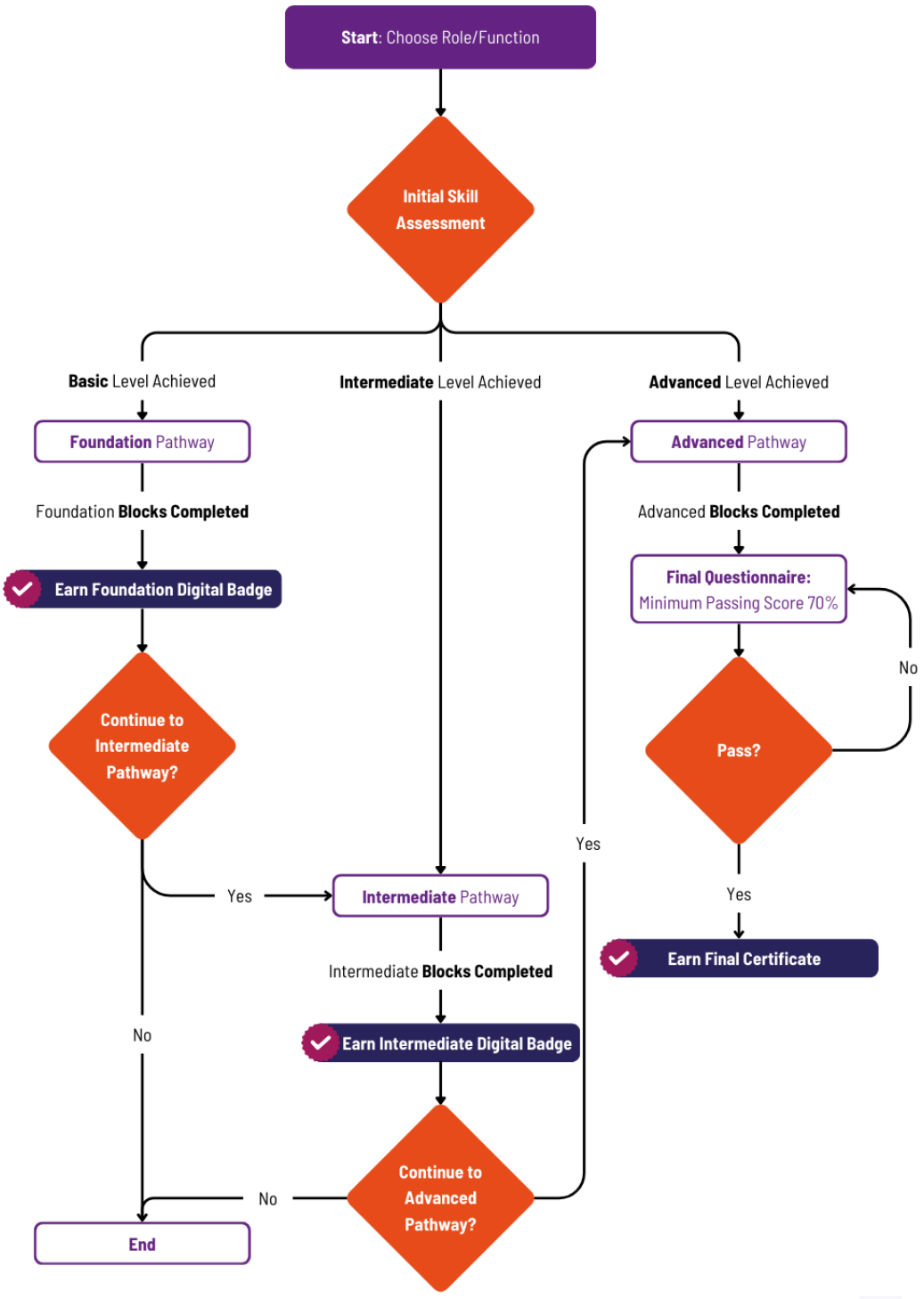
Additionally, the integration of AI technologies in retail has been shown to revolutionize operations, but successful implementation requires employee training that addresses both technical and ethical aspects. For instance, developing AI-specific roles such as AI Retail Oversight Officers can help ensure responsible AI use and bridge knowledge gaps (Ejjami & Rahim, 2024).

For this reason, the ethical learning block is a crucial component of the learning pathways in organizations, particularly in sectors such as MSMEs where employees often handle multiple roles. The inclusion of ethics in training programs ensures that employees are equipped with a strong understanding of the ethical implications of their decisions and actions. This is important as businesses increasingly adopt technologies like Artificial Intelligence (AI), which require careful consideration of data privacy, algorithmic bias, and responsible usage (Echegu, 2024). In addition, MSME employees who understand ethical principles are better equipped to uphold organizational values in every aspect of their roles (Chen, 2024).

A flow diagram has been developed to provide a structured overview of the entire system, illustrating the interconnected steps from role/function identification to advanced certification. This visual tool aims to make it easier for stakeholders - including educators, learners, and organisational leaders - to understand the learning pathways and their alignment with role-specific competencies.

Beyond its communicative function, the flow diagram serves as a blueprint for the implementation of the curriculum. It summarises the design logic, ensuring that the curriculum can be executed systematically and with clarity.

Figure 3. Flow Diagram of Differentiated AI Learning Pathways



6. Guidance on implementation

This chapter provides guidance for INAIR curriculum implementation, structured to support educators in delivering the curriculum effectively while ensuring alignment with its objectives. Educators should adapt this guidance to suit their teaching environment, making use of the flexibility built into the curriculum to maximise learner engagement and skill acquisition.

6.1 Preparation

6.1.1 Introduction

The success of implementing the INAIR curriculum largely depends on thorough preparation. This includes the allocation of sufficient time and resources for course planning and resource gathering. Unlike rigid course packages, the INAIR curriculum is intended to be adaptable and flexible, suitable for both online and in-person delivery formats, and supports various teaching methods and learning experiences based on the preferences and capabilities of educators.

6.1.2 General Considerations

- **Structure:** Each Learning Block within the curriculum focuses on AI and its applications in retail. The AI core curriculum has been structured into distinct blocks covering foundational, intermediate and advanced skills. Each Learning Block defines specific topics, objectives, and skills, ensuring that students receive a comprehensive understanding aligned with industry needs.
- **Resources:** Educators should carefully review the syllabus, content and associated material to understand the objectives of each LB. This includes familiarising themselves with AI concepts, methodologies and their practical applications in retail, as outlined in the curriculum. A comprehensive review will ensure that teachers are equipped to meet the instructional demands of the course.
- **Teaching strategy:** Teachers who deliver the course should coordinate to ensure consistency across topics and methods. Discussing the curriculum's aims and teaching strategy with peers may lead to innovative approaches that enhance student engagement and facilitate better understanding.
- **Flexibility:** The curriculum allows flexibility in delivery formats, which means it can be implemented through blended, online, or in-person methods. Educators are encouraged to use a variety of instructional techniques, such as interactive sessions, digital presentations, and hands-on AI tool demonstrations, to cater to different learning styles.

6.1.3 Specific Considerations

- **The scope of each learning block should align with the needs of MSMEs in retail**, addressing foundational, operational, and strategic AI skills. Any specific national or local requirements

should be identified and integrated as necessary, to ensure the curriculum meets regional industry standards.

- Educators should thoroughly understand the **objectives outlined in each LB** to ensure a clear and consistent delivery. The course objectives provide a roadmap for learning outcomes, enabling students to progress through foundational to advanced skills in AI applications for retail.
- The curriculum design includes an **initial assessment to determine the entry level** of each participant fulfilling various roles specific to MSMEs. Based on this assessment, learners are placed on appropriate learning pathways within the Foundation, Intermediate, or Advanced levels. The assessment tool helps customise learning experiences to support both beginners and more advanced participants.
- Upon completing certain blocks, students will receive **digital badges** for Foundation and Intermediate levels. Upon completing the Advanced level, including a 70% pass mark in a final assessment, they will receive a **final certificate**.

6.1.4 Staff Requirements

- Educators involved should have a solid foundation in Artificial Intelligence (AI) as it applies to the retail sector, including familiarity with machine learning, data analysis, AI ethics, and specific AI tools relevant to retail. This includes hands-on experience with AI-driven tools and technologies, as well as knowledge of the impact of AI on retail operations, customer engagement, inventory management, and business intelligence.
- Given the AI focus, educators should be comfortable with technology and digital tools, such as AI platforms, data visualisation software, and learning management systems (LMS). Technical proficiency enables staff to support learners in practical exercises, troubleshoot minor technical issues, and facilitate hands-on experience with AI tools.
- Ideally, educators should have practical experience in the retail sector, with an understanding of how AI is transforming various functions within it. This real-world experience allows educators to bridge theory and practice, offering learners insights into current trends, challenges, and best practices in AI-enhanced retail operations.
- A designated "course coordinator" should be appointed to oversee curriculum implementation. This person should have a background in curriculum development and instructional design, ensuring that the course meets educational standards and learning objectives. The coordinator would manage resources, review teaching quality, and ensure that content delivery aligns with curriculum goals. Additionally, the coordinator should be responsible for maintaining consistency across teaching approaches, assessments, and learning materials.

6.1.5 Teaching Facilities

- **Equipment:** Given the digital nature of the INAIR curriculum, learning environments must be properly equipped with audiovisual aids, interactive tools, and software for data management, machine learning, and natural language processing (NLP). Physical spaces, if used, should support group discussions, presentations, and hands-on activities with AI tools.
- **Teaching Aids:** Interactive teaching aids, such as case studies, simulations, and collaborative

activities, are recommended. These tools help reinforce practical AI applications and facilitate understanding of how AI can address specific challenges in retail.

6.2 Notes on Teaching Technique

6.2.1 Preparation

- **Identify sections to cover:** Educators should begin by carefully reviewing each Learning Block, paying particular attention to the critical content, skills, and key concepts. This involves understanding the foundational topics of AI within the retail context, ensuring these are well-prepared for effective communication to learners. It is crucial for educators to identify the main objectives of each section to align instruction with the intended outcomes of the curriculum.
- **Thorough study:** It's important that educators study all Learning Blocks' components in-depth. This includes not only the core content but also related industry examples and case studies that can help contextualise AI's applications in retail. This thorough understanding allows educators to present the material confidently and answer learners' questions effectively.
- **Gather necessary resources:** Educators should collect all necessary teaching resources, including textbooks, digital resources, reference papers, and any supplementary materials. Access to these resources ensures that learners have multiple perspectives and references to support their learning journey. These resources should also include digital platforms for online learning, such as video links, interactive modules, and reference guides.
- **Equipment setup:** Whether the sessions are conducted in-person or online, it is essential to ensure all necessary equipment is available and functional. For in-person classes, this includes projectors, whiteboards, and computers. For online sessions, educators should be comfortable with collaborative software, such as video conferencing tools, screen sharing, and interactive features like polls or quizzes, to keep learners engaged.
- **Use of lesson plans:** Lesson plans are vital to breaking down each LB into manageable and sequential teaching steps. Educators should use brief statements to outline the core points, specify key topics, and allocate sufficient time for each teaching segment. Lesson plans should incorporate a range of teaching methods, including audiovisual aids, to make the session engaging and retain learners' attention throughout.
- **Assessment strategies:** The INAIR curriculum is designed to facilitate assessment of learners' understanding through various forms of evaluation. Educators can use discussions, written tests, quizzes, and practical tasks as part of their assessment strategy. This multi-faceted approach allows educators to track learners' progress accurately and identify any gaps in knowledge. Regular assessments also encourage learners to remain engaged and provide opportunities for immediate feedback.
- **Facility check:** Prior to each session, ensure that all equipment and materials are set up and functioning correctly. This is particularly important for sessions involving practical exercises or lab-based components. For online learning, verify that all digital tools and resources are accessible and that both educators and learners are comfortable using them.

6.2.2 Delivery

- **Engage directly with learners:** Maintaining direct engagement with learners is essential for fostering an interactive environment. This helps to create a more inclusive atmosphere and encourages learners to participate actively.
- **Clear communication:** Speak clearly and at a suitable volume for all learners, ensuring that instructions and explanations are comprehensible. For online sessions, make sure that audio and video quality are optimal, and check in with learners regularly to confirm that they are following along.
- **Varied instruction:** Incorporate different instructional methods to reinforce key points and address diverse learning styles. This can include speaking, writing, visual aids, hands-on exercises, and interactive discussions. Varied instruction helps retain interest, provides multiple perspectives on complex topics, and caters to learners who may prefer different methods of information absorption.
- **Inclusive engagement:** Encourage learners to ask questions, participate in discussions, and engage in interactive activities. This maintains a high level of engagement and fosters a collaborative learning environment. Educators should acknowledge all contributions, promoting a sense of inclusivity and mutual respect among learners.
- **Adjustments based on learner needs:** Be observant of learners' responses and adjust teaching methods accordingly. Some learners may require more examples or step-by-step explanations, while others may be ready to progress quickly through certain sections. Flexibility in teaching allows educators to meet both individual and group needs effectively.
- **Manage group activities:** Facilitate balanced participation during group discussions and activities. Educators should guide conversations to ensure that all learners have the opportunity to contribute and that no single participant monopolises the activity. Techniques such as directed questions and small group work can be used to promote inclusivity.
- **Content relevance:** Stick closely to the Learning Block content, focusing on material directly related to the learning objectives. Avoid introducing content that is too advanced or unrelated, as this may detract from the curriculum's goals and confuse learners. Where appropriate, contextualise complex concepts with relevant retail-specific examples.
- **Preparation:** Reaffirm the importance of preparation in delivering effective instruction. Good preparation enables educators to anticipate and address potential challenges, reduces the risk of disruptions, and ensures that the curriculum is delivered in a structured and organised manner.

6.3 Recommendations for Course Content Development

The INAIR curriculum encompasses a structured series of LBs, each tailored to build AI skills relevant to retail. The curriculum is flexible, allowing customisation to meet different educational or industry requirements, while maintaining a core structure for consistency.

R1. Learning outcomes

Learning outcomes are clearly defined, describing what the learner should be able to achieve at each stage (see Bloom's Taxonomy). Each outcome is specific, measurable, and directly related to

the knowledge or skills that learners are expected to acquire. The **course developer** shall use the **learning outcomes** as a foundational guide for designing and structuring the course content, ensuring that every module, topic, and activity directly contributes to achieving the stated learning outcomes.

R2. Course content

Each LB specifies concepts, guiding questions, the required skills and knowledge as well as the refined contents in AI for retail, focusing on practical applications that would lead to achieving the learning outcomes. The course content should be built on the fractal educational model, and therefore on the four core components of fractal learning: concept-based curriculum design, student-centred teaching, heutagogy (a learner-centred educational approach that emphasises self-determined learning) and openness. The course developer shall consider that the role of the teacher changes from the transmission of knowledge to being a guide and a counsellor in the construction of knowledge, fostering the development of self-directed learning skills.

R3. Low-barrier technology integration

The course creators should focus on integrating low-cost, user-friendly AI tools that are suitable for SMEs with limited digital expertise or resources. They should provide step-by-step guides and practical examples to facilitate easy adoption of these tools. Additionally, the goal of increasing foundational digital skills should be incorporated into the early learning blocks to prepare participants for effective engagement with AI technologies.

R4. AI tools

AI tools integrated into the curriculum should support the achievement of learning outcomes by providing practical, real-world applications that enhance learners' understanding of AI concepts. Educators should encourage critical evaluation of these tools using the European Commission's **Assessment List for Trustworthy AI (ALTAI)** framework, which helps assess trustworthiness across dimensions such as transparency, fairness, and accountability. When selecting AI tools, educators should prioritise those that align with the curriculum's ethical AI practices and are accessible and relevant to learners' contexts. Additionally, AI tools should be presented with clear instructions and examples to ensure ease of use, fostering both confidence and ethical awareness in their application.

R5. Flexible learning formats

The course creators should structure the curriculum to include flexible learning formats, such as asynchronous online modules, short in-person workshops, and modular learning blocks, to accommodate the time and resource limitations of SME workers. These formats should minimize disruptions to daily operations while ensuring accessibility. Furthermore, opportunities for peer learning and local networking should be included to promote collaboration and knowledge sharing among SME participants.

R6. Assessment

Assessments should be aligned with the learning outcomes and designed to objectively measure learners' progress. They should provide clear feedback on learners' comprehension and

application of course material. Assessments may include a mix of practical tasks, written tests, quizzes, and project-based evaluations, for example. Objective assessment methods allow educators to evaluate learners' knowledge and skills reliably, ensuring that they meet the curriculum's standards and are prepared for practical application in the retail AI domain.

R7. Progress tracking

The use of structured assessment methods enables educators to track learners' progress throughout the curriculum. The course designer should incorporate continuous evaluation tools to monitor learners' performance. They must ensure feedback mechanisms are in place to help learners stay on track and achieve desired outcomes. Timely feedback would allow learners to address areas needing improvement before progressing to the next level.

R8. Awarding badges and certificates

Upon successful completion of Foundation, Intermediate, or Advanced level specific Learning Blocks, learners are awarded digital badges. The course designer must clearly define criteria for earning digital badges, ensuring alignment with the learning objectives and competencies of the Learning Blocks. They should design engaging and effective assessments that accurately measure progress and mastery, while also creating a comprehensive final assessment aligned with the Advanced level content. A final certificate is awarded after completing the Advanced level, contingent on achieving at least a 70% score in the final assessment.

R9. Addressing participant needs and profiling

The course creators should ensure that training considers the organisational functions and the competency levels of participants. Conducting a participant profiling is essential to embarking participants on differentiated AI learning pathways that not only address specific challenges but also enable gradual progression. The training should provide participants with access to materials and tools that are appropriate for their level of advancement, ensuring a personalized and effective learning experience.

R10. Systematic feedback collection and continuous improvement

The course creators should implement systematic feedback collection from participants to evaluate the impact of training on their skill development, engagement, and motivation to apply new competencies. Feedback should cover both the content quality and the perceived value of the training in real-world applications. Based on this input, the effectiveness of the training should be regularly assessed, and necessary improvements introduced. Particular emphasis should be placed on addressing the shift in digital mindset, ensuring that participants not only acquire new skills but also transform their perspective on technology and its role in their daily work.

During the preparation of this work the authors used generative AI tools in order to improve readability and language of the work. After using this tool/service, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

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