



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** X **Month of publication:** October 2026

DOI: <https://doi.org/10.22214/ijraset.2026.85229>

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Artificial Intelligence in Production and Optimization

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Abstract: *This review is a systematic literature review-cum-bibliometric analysis of the field of Artificial Intelligence in Production and Optimization with a view to mapping the field in holistic manner. In this review the authors have attempted to identify the predominant strands in the field and identify where learning approaches have been linked to decision making frameworks and where learning approaches end at prediction. Data for the review are sourced from Elsevier's Scopus database, and are limited to English language journal articles and reviews published between 2014 and 2027 using key words. This review is based on 3,727 records in the final database. The number of documents published has increased from 38 in 2014 to 1,161 in 2026 and the top producers are China, India, and the United States. The most prevalent themes were identified as Artificial Intelligence, Machine Learning, and Optimization. The formal decision model seems to be mainly in the field of scheduling, while in bioprocess and additive manufacturing, and food systems, it is not often that the decision is made to end at prediction.*

Keywords: *Artificial Intelligence; Production; Optimization; Machine Learning; Scheduling; Bibliometric Analysis.*

I. INTRODUCTION

Production systems are now asked to raise output and hold a process stable under tighter energy, waste, and quality constraints. Artificial intelligence is used for both jobs. It forecasts a failure, a yield, or a demand, and it is also asked to choose a schedule, a setpoint, or a route. The two uses are not the same. A forecast can be accurate and still leave the decision to a rule of thumb. The most cited paper in the set studied here, (Tao & Zhang, 2017), treats the shop floor as a digital twin that can be monitored and improved. Later work has pushed related tools into waste-to-energy, renewable power, fermentation, additive manufacturing, and food chains. What is less often shown is a formal decision model sitting under the forecast.

The literature that makes this claim has grown too fast, and too unevenly, for a narrative review of a few well-known papers. A Scopus search on “Artificial Intelligence AND Production AND Optimization”, limited to 2014–2027, English, and journal articles and reviews, retained 3,727 records. The performance file holds 3,725 documents from 1,484 sources, written by 12,416 authors. The review corpus has 3,719 unique records in the same window. In both counts, 55 per cent of the documents are dated 2025 or 2026. Annual output stayed between 38 and 62 documents from 2014 to 2018, reached 106 in 2020, and then rose to 162, 231, 312, 493, 899, and 1,161 from 2021 to 2026. The 2026 figure is not a full year. The export was taken on 11 September 2026. The 16 documents dated 2027 are papers already assigned that year. The reported annual growth rate of –6.44 per cent compares the first year with the last, so the small 2027 count pulls it below zero. Set against 2014, the 2026 count implies growth of about 33 per cent a year. A straight trend line fits badly and should not be used to forecast. The largest source, Applied Sciences, holds 75 documents, about 2 per cent of the file. The topic is not housed in one journal.

A count-and-map reading is the right instrument for a set of this size. Bibliometric analysis summarises trends, themes, and the most active authors and countries, and science mapping shows how the publications connect (Donthu et al., 2021; Zupic and Čater, 2015). A systematic selection, with the search and the filters fixed in advance, reduces the chance that the set is assembled by preference (Linnenluecke et al., 2020). A review also needs a stated path from identification to classification and evaluation (Paul et al., 2021). The search began with 8,311 Scopus records. A time filter left 7,432. A document-type filter for articles and reviews left 4,134. An English-language filter left 3,755. A journal filter left 3,727. The path is drawn as a PRISMA flow diagram. PRISMA records identification, screening, eligibility, and inclusion, and the number excluded at each step. It is a reporting guideline, not a review method and not a quality-appraisal tool (Moher et al., 2010). Records were downloaded in BibTeX and analysed in Biblioshiny/Bibliometrix and VOSviewer, with Excel used for further counts (Aria and Cuccurullo, 2017; van Eck and Waltman, 2010). The planned analyses cover publication trend, citation, authors, journals, keywords, and collaboration (Donthu et al., 2021). The Scopus export has no cited references, so co-citation and bibliographic coupling could not be run. What the file supports is a performance reading and a keyword reading.

The maps answer who publishes, and on which words. They do not answer whether a learning method has been joined to a decision model. The corpus rarely uses the jargon of operations research. Twenty records name the discipline. One hundred and twenty-three records, 3.3 per cent, mention mixed-integer programming, linear programming, stochastic programming, robust programming, or constraint programming. Artificial intelligence, machine learning, and optimization dominate the keyword maps. Scheduling is the clearest meeting point. (C. Zhang et al., 2023) reviewed learning-based approaches to scheduling, packing, and routing. (Esteso et al., 2023) examined 181 articles and found reinforcement learning applied mainly to production scheduling, usually with model-free, single-agent algorithms in simplified environments. That finding lines up with (Y. Zhang et al., 2022), a multi-agent deep reinforcement learning treatment of a dynamic job shop under stochastic order and resource disturbances, and with (Li et al., 2020), which pairs a learned rule with an optimisation step for rescheduling in Industry 4.0. (Usman et al., 2026) reviewed about 300 papers on job-shop scheduling with resource flexibility, and (Prata et al., 2024) examined 170 on constraint programming in scheduling. In some of these papers the optimisation model is kept and learning only forecasts cost or demand (Boresta et al., 2024). A linear programming plan can also be paired with a machine-learning forecast (Vaz et al., 2024). Robust formulations appear, but they are scarce: a local-search ant colony for hot-rolling schedules (R. Zhang et al., 2020), and a greenhouse controller that puts robust optimisation inside deep reinforcement learning (Ajagekar et al., 2023). “Robust optimization” has 9 hits in the corpus, “vehicle routing” has 4, and “reinforcement learning” has 107.

Outside scheduling, the published work more often stops at the forecast. Predictive maintenance, quality control, and digital twins are middle-sized nodes, with 89, 140, and 135 records. A hybrid convolutional and long short-term memory model forecasts machine failure (Wahid et al., 2022), and an industrial internet-of-things platform supports quality applications (Christou et al., 2022). The step from that forecast to a schedule is uncommon. (Danach et al., 2026) is one of the few records that carries a failure prediction into a maintenance schedule. In the bioprocess cluster the same split appears. (Imamoglu, 2024) and (Hossain et al., 2022) use learning to model biomass productivity and carbon fixation. (Kabir et al., 2023) predicts and optimises hydrogen yield. (Murali et al., 2026) reports that plants are mostly run on operator experience, and that research has focused on supply chains and laboratory cases rather than plant-level decisions. Of 418 records on fermentation, metabolism, microalgae, or bioprocesses, two record a formal programming method or model predictive control.

The small circles show the same limit. (Soori et al., 2025) and (Ciccone et al., 2023) find machine learning used for quality, process, design, and material formulation in additive manufacturing. (Elbadawi et al., 2020) predicts printability from 614 formulations and does not schedule the build queue. (Serov & Vinogradov, 2022) treats data-driven design of nanomedicines as still early. (Nguyen et al., 2025) finds explainable methods limited in that domain, and (Martini et al., 2024) names additive manufacturing as a case for human-centred Industry 5.0. None of these papers moves from a printability score to build-queue scheduling, batch composition, or capacity planning. Food-chain studies repeat the pattern. (Kollia et al., 2021) uses deep networks for greenhouse yield and packaging-label control. (Dakhia et al., 2025) covers food computing, supply-chain optimisation, and safety. (Pandey et al., 2023) treats learning as a preservation tool. (Tsolakis et al., 2022) is the less common logistics case, automated vehicles in a container terminal, and it reports little work on the environmental cost of the AI system inside the decision model.

A further set of topics sits beside the decision model rather than inside it. (Tóth et al., 2023) outlines a human–AI architecture. (Yang et al., 2022) applies federated learning to industrial internet-of-things services. Large language models are among the fastest-growing labels, with 77 of 122 mentions dated 2026. (Chen & Huang, 2025) joins them to reinforcement learning for crop production. (Bozejko et al., 2026) pairs autonomous AI with quantum computing for a two-machine scheduling problem, and (Ajagekar & You, 2022) surveys quantum AI for sustainable energy. (Wheeler, 2026) adds a caution: across 73 empirical studies, the environmental outcomes of AI vary tenfold to sixtyfold across regions.

Four gaps sit behind the large nodes. Learning meets a precise decision model mainly in scheduling, and rarely in bioprocess, additive manufacturing, or food systems (Esteso et al., 2023; Murali et al., 2026). Uncertainty is seldom handled with robust or stochastic formulations. Explainability, human oversight, and privacy-preserving coordination appear as separate topics, not as constraints inside a decision model (Nguyen et al., 2025; Yang et al., 2022). The objective rarely includes the resource cost of the model itself (Wheeler, 2026). A reading that stops at artificial intelligence, machine learning, and optimization will miss all four.

The present review therefore does two jobs. It describes the performance and the keyword structure of the 2014–2027 literature, and it uses that structure to locate where learning has been connected to a formal decision model. Four questions follow. How has output changed from 2014 to 2027, and what does the performance file say about authors, sources, and citations? Which countries produce the work, and how concentrated is authorship? How do author keywords cluster at co-occurrence thresholds of 15 and 30? Where has learning been connected to a formal decision model, and where has it stopped at a prediction?

The sections that follow set out the selection and the tools, the performance and keyword results, and the review of that last question. The conclusion returns to the four questions, states what the maps cannot show, and sets out the work that the gaps imply.

II. LITERATURE REVIEW

The study and mapping of artificial intelligence for production and optimisation is now a vast field of research and many authors have tried to chart it. According to (Esteso et al., 2023), reinforcement learning applications in production planning and control are primarily model-free and single-agent, where-as (Christou et al., 2022) noted that the predictive maintenance, quality management and zero-defect manufacturing are some of the most noticeable smart manufacturing use cases. (Ng et al., 2024) showed that the frequent applications of machine learning to additive manufacturing are quality control, process optimisation, and design optimisation. The collection of these accounts indicates that the field has emerged independently and that there are distinct sets of approaches for prediction, scheduling, and process design. The question addressed in the present review is as follows: Where has learning been linked to a formal optimisation model, and where has it been left to simply provide predictions? Studies are sorted according to the decisions made (scheduling/planning, maintenance/quality control and process/bioprocess operations), and special emphasis is given to the limitations noted by the authors, as these are most clearly indicators of where additional study is required, and where the evidence is lacking.

Where operations research does appear, scheduling is its most visible point of contact with learning methods. (C. Zhang et al., 2023) reviewed learning-based approaches to scheduling, packing and routing in manufacturing, and (Esteso et al., 2023), who examined 181 articles, reported that reinforcement learning has been applied mainly to production scheduling, usually with model-free, single-agent algorithms in simplified planning environments. This observation is consistent with the dynamic job-shop formulation of (Liu et al., 2022), in which a multi-agent deep reinforcement learning system responds to stochastic order and resource disturbances, and with (Zhou et al., 2020), who pair a hybrid metaheuristic with a classifier that judges when rescheduling is worthwhile. (Usman et al., 2026) analysed approximately 300 papers on job-shop scheduling with resource flexibility, while (Prata et al., 2024) examined 170 papers on constraint programming in production scheduling. Because (Esteso et al., 2023) point to simplified test environments, it remains unclear from these syntheses whether learned policies retain their advantage over tuned exact solvers on realistic instances.

A different set of studies maintains the optimisation model and assigns learning a supportive role. In (Boresta et al., 2024) an OR model is used to allocate shared resources and to determine the cost shares between the parties, which are then used to train machine-learning models that help forecast the costs of services, whilst in (Vaz et al., 2024) a machine-learning demand forecasting model is fed into a linear programme to plan the production in an electronics company, considering the demand as the input. In both, the optimisation model is still the key to feasibility, whereas this is not the case with end-to-end learned policies. Only in a few cases, uncertainty is dealt with formally. (R. Zhang et al., 2020) develop a strong mixed-integer model of hot-rolling scheduling, solve it by employing ant colony search, embed robust optimisation in a deep reinforcement learning controller for greenhouse climate, as done by (Ajagekar et al., 2023), and build a stochastic, multi-objective simulation-optimisation model of a vaccine supply chain as done by (Kamran et al., 2023). The number of records of the word counts is instructive: “robust optimization” has 9 hits; “vehicle routing” has 4 hits; and “reinforcement learning” has 107 hits.

Predictive maintenance, quality control and digital twins represent middle-sized nodes in the manufacturing cluster, taking predictive capabilities a long way from the realm of decision-making. A hybrid CNN-LSTM framework was used to predict machine failures from sensor time series by (Wahid et al., 2022); while (Christou et al., 2022) noted that predictive maintenance, quality management and zero-defect manufacturing are key use cases of smart manufacturing that are challenging to develop given the requirement to integrate diverse systems. Both studies come to an end with the forecast. The transition from a failure probability to a maintenance schedule, a reordering of spares or a reallocation of a production line is a point at which OR models normally work and (Danach et al., 2026) are some of the few that do. The cross sections between these forecasts and formal scheduling or inventory models are much less well documented than the forecasts themselves, with 89 records for “predictive maintenance”, 140 for “quality control” and 135 for “digital twin”.

The microalgae, anaerobic digestion, biofuel and hydrogen production are small nodes and exhibit a different pattern within the sustainability and bioprocess clusters. (Imamoglu, 2024) highlighted the current challenges in the application of microalgae processes and identified the need for more data, more complex and scalable models for broader use of AI and machine learning applications. (Hossain et al., 2022) employed boosted regression trees, neural networks, and support vector regression with Bayesian optimisation to model biomass productivity and CO₂ biofixation, while (Kabir et al., 2023) used machine learning for prediction and optimisation of GH production using dark fermentation and PEM technologies.

(Murali et al., 2026) state that AD plants are mostly operated on a conservative basis based on experience of the operators and current research focuses on optimizing the supply chain, techno-economic analysis, and small lab scenarios but not on a decision making at plant level. Their argument is consistent with the corpus: Of 418 records on fermentation, metabolism, microalgae or bioprocesses, only two record the use of mixed-integer, linear, stochastic, robust and dynamic programming, or model predictive control. The pattern seems to indicate that learning is utilized to make a prediction, and the decisions that follow this prediction are not formulated.

The small periphery on the same maps are Additive Manufacturing, 3D Printing, Drug Delivery and Personalised Medicine. Quality control, process optimisation, design optimisation, microstructure analysis, and material formulation are the common applications of machine learning in additive manufacturing identified by (Ng et al., 2024) and (Cicccone et al., 2023) based on 48 papers, arrived at the same conclusion of optimisation using AI in additive manufacturing. (Elbadawi et al., 2020) have predicted the printability of medicines from 614 drug-loaded formulations, while Serov and (Serov & Vinogradov, 2022) say that the data-driven design of nanomedicines is still in its infancy. (Ukwaththa et al., 2024) concluded that the use of explainable AI in Additive Manufacturing is still limited, and (Martini et al., 2024) suggested Additive Manufacturing as a use case for human-centred AI in Industry 5.0. All of the studies mentioned here do not answer the questions that follow after prediction of the printability of the aforementioned product, which include scheduling of the build-queue, composition of the batch or capacity planning for personalised dosage forms.

Food safety and food chains are in a similar situation. (Kollia et al., 2021) used deep neural architectures in three phases of the food supply chain, which include greenhouse yield prediction, packaging label control and more recently, (Dakhia et al., 2025) described the use of AI-enabled IoT for food computing, including supply chain optimisation and food safety. Similarly, (Pandey et al., 2023) discuss the use of machine learning as a protection tool for fruit and vegetable preservation. (Tsolakis et al., 2022) address a less common logistics application, automated guided vehicles in a container terminal and report an absence of research in the field of environmental sustainability of AI-enabled operations in decision support systems and optimisation models. The rest of the accounts focus mainly on the detection and prediction process and do not elaborate much on the allocation and routing process.

Four further themes appear only at the edge of the maps. Explainability is the first. (Danach et al., 2026) attach SHAP-based explanations to a gradient-boosting model that feeds a predictive-maintenance scheduling formulation, so that maintenance engineers can validate its outputs, yet only two records in the corpus combine explainability vocabulary with exact OR-method terms. Human involvement is the second: (Tao et al., 2024) propose a multi-objective framework in which human input interacts with genetic algorithms, particle swarm optimisation and reinforcement learning, and (Tóth et al., 2023) outline a human-AI collaboration architecture for Industry 5.0, but “human-in-the-loop” occurs as a keyword in only four records. Federated learning is the third. (Yang et al., 2022) apply it to service provisioning in industrial IoT, and it features in only about 35 records. Large language models are the fourth and fastest growing, with 77 of 122 mentions dated 2026. (Chen & Huang, 2025) combine them with reinforcement learning for crop management, (Božejko et al., 2026) pair autonomous AI with quantum computing for a two-machine scheduling problem, and (Ajagekar & You, 2022) survey quantum AI for sustainable energy. (Wheeler et al., 2026) add a caution, reporting from 73 empirical studies that the environmental outcomes of AI vary tenfold to sixtyfold across regions.

The evidence suggests that the following four gaps are masked by the large nodes. Learning is coupled with precise decision models primarily in scheduling, and virtually never in bioprocess, additive manufacturing or food systems, where prediction is prevalent, but prescription is not. Second, as the nine records of robust optimization show, uncertainty is not adequately treated with the firm and stochastic formulations that are more in the spirit of OR practitioners. Third, explainability, human oversight and privacy-preserving coordination are positioned not as a constraint within a decision model, but as a separate topic. Fourth, the objective function doesn't often include the resource cost of AI itself, which (Wheeler et al., 2026) demonstrate to be region-dependent. A study that makes recommendations for one of the small-circle domains, and tries them out against exact benchmarks in a context of uncertainty, would therefore fill a gap directly supported by the corpus, and would have the further advantage of addressing a domain, the small-circle domains, in which the established OR literature has not yet reached.

A systematic literature review of the available literature is performed and summarized and critically evaluated. Table 1 summarizes the 589 review and survey articles on the topic of “Artificial Intelligence in Production and Optimization” that were identified. The authors of these reviews could see that a significant number of papers are concerned with artificial intelligence, machine learning and optimization techniques and that many of the papers use these techniques in various fields such as manufacturing, energy systems, sustainability, supply chain management and agriculture. The first review studies were done in 2000, and they involved genetic algorithm-based multiobjective optimization (Coello, 2000) and pattern recognition (Nieddu & Patrizi, 2000). In the most recent years, the number of reviews has rapidly increased, with over half appearing since 2025.

The latest research is centered on sustainable, data-driven and AI-driven methods, including digital twins, smart manufacturing, and data-driven decision making. In Table 1 the basic results of the reviews performed in this field are summarized.

Table 1. Summary of Review articles

Authors	Scope of Review	Type of Study
COELLO CAC (2000)	An Updated Survey of GA-Based Multiobjective Optimization Techniques	2000
NIEDDU L; PATRIZI G (2000)	Formal methods in pattern recognition: A review	2000
BANSAL RC; BHATTI TS; KOTHARI DP (2003)	Artificial intelligence techniques for reactive power/voltage control in power systems: A review	2003
KALOGIROU SA (2003)	Artificial intelligence for the modeling and control of combustion processes: A review	2003
CAI H; LIU J; CHEN Y; et al. (2006)	Survey of the research on dynamic weapon-target assignment problem	2006
MELLIT A; KALOGIROU SA (2008)	Artificial intelligence techniques for photovoltaic applications: A review	2008
WANG F; CHEN B; MIAO Z (2008)	A survey on reviewer assignment problem	2008
HEIMANN T; MEINZER HP (2009)	Statistical shape models for 3D medical image segmentation: A review	2009
BLUM C; PUCHINGER J; RAIDL GR; et al. (2010)	A brief survey on hybrid metaheuristics	2010
WANG F; SHI N; CHEN B (2010)	A comprehensive survey of the reviewer assignment problem	2010
MARKELJ P; TOMAŽEVIČ D; LIKAR B; et al. (2012)	A review of 3D/2D registration methods for image-guided interventions	2012
NGUYEN TT; YANG S; BRANKE J (2012)	Evolutionary dynamic optimization: A survey of the state of the art	2012
QIN SJ (2012)	Survey on data-driven industrial process monitoring and diagnosis	2012
BOYSEN N; FLIEDNER M; JAEHN F; et al. (2013)	A survey on container processing in railway yards	2013
BURKE EK; GENDREAU M; HYDE M; et al. (2013)	Hyper-heuristics: A survey of the state of the art	2013
NIKNAFS A; DENZINGER J; RUHE G (2013)	A systematic literature review of the personnel assignment problem	2013
BRAVO C; SAPUTELLI L; RIVAS F; et al. (2014)	State of the art of artificial intelligence and predictive analytics in the E&P industry: A technology survey	2014
CASTILLO-VILLAR KK (2014)	Metaheuristic algorithms applied to bioenergy supply chain problems: Theory, review, challenges, and future	2014
DEMESOUKA VAVATSIKOS ANAGNOSTOPOULOS (2014)	OE; AP; KP GIS-based multicriteria municipal solid waste landfill suitability analysis: A review of the methodologies performed and criteria implemented	2014

KARABOGA D; GORKEMLI B; OZTURK C; et al. (2014)	A comprehensive survey: Artificial bee colony (ABC) algorithm and applications	2014
NOURANI V; HOSSEINI BAGHANAM A; ADAMOWSKI J; et al. (2014)	Applications of hybrid wavelet-Artificial Intelligence models in hydrology: A review	2014
RENZI C; LEALI F; CAVAZZUTI M; et al. (2014)	A review on artificial intelligence applications to the optimal design of dedicated and reconfigurable manufacturing systems	2014
BELLO O; HOLZMANN J; YAQOOB T; et al. (2015)	Application of artificial intelligence methods in drilling system design and operations: A review of the state of the art	2015
ESHRAGH F; POOYANDEH M; MARCEAU DJ (2015)	Automated negotiation in environmental resource management: Review and assessment	2015
HAZIR Ö; DELORME X; DOLGUI A (2015)	A review of cost and profit oriented line design and balancing problems and solution approaches	2015
HOU J; ZHOU K; ZHANG XS; et al. (2015)	A review of closed-loop reservoir management	2015
DONGRE VB; GANDHI RS (2016)	Applications of artificial neural networks for enhanced livestock productivity: A review	2016
JONES D; TAMIZ M (2016)	A review of goal programming	2016
REN Y; ZHANG L; SUGANTHAN PN (2016)	Ensemble Classification and Regression-Recent Developments, Applications and Future Directions [Review Article]	2016
ABDULLAH MAKE MR; AB. RASHID MFF; RAZALI MM (2017)	A review of two-sided assembly line balancing problem	2017
ARULKUMARAN K; DEISENROTH MP; BRUNDAGE M; et al. (2017)	Deep reinforcement learning: A brief survey	2017
BANDARU S; NG AHC; DEB K (2017)	Data mining methods for knowledge discovery in multi-objective optimization: Part A - Survey	2017
BLEI DM; KUCUKELBIR A; MCAULIFFE JD (2017)	Variational Inference: A Review for Statisticians	2017
DEB C; ZHANG F; YANG J; et al. (2017)	A review on time series forecasting techniques for building energy consumption	2017
GAMBHIR M; GUPTA V (2017)	Recent automatic text summarization techniques: a survey	2017
MUJTABA G; SHUIB L; RAJ RG; et al. (2017)	Email Classification Research Trends: Review and Open Issues	2017
SHYMCHENKO AV; TERESHCHENKO VV; RYABOV YA; et al. (2017)	Review of the computational approaches to advanced materials simulation in accordance with modern advanced manufacturing trends	2017
VITORINO DE SOUZA MELARÉ A; MONTENEGRO GONZÁLEZ S; FACELI K; et al. (2017)	Technologies and decision support systems to aid solid-waste management: a systematic review	2017
DAS UK; TEY KS; SEYEDMAHMOUDIAN M; et	Forecasting of photovoltaic power generation and model optimization: A review	2018

al. (2018)		
DUNJKO V; BRIEGEL HJ (2018)	Machine learning & artificial intelligence in the quantum domain: A review of recent progress	2018
FARIS H; ALJARAHA I; AL-BETAR MA; et al. (2018)	Grey wolf optimizer: a review of recent variants and applications	2018
GÜNEŞ BAYDIN A; PEARLMUTTER BA; ANDREYEVICH RADUL A; et al. (2018)	Automatic differentiation in machine learning: A survey	2018
KIUMARSI B; VAMVOUDAKIS KG; MODARES H; et al. (2018)	Optimal and Autonomous Control Using Reinforcement Learning: A Survey	2018
KOGLER C; RAUCH P (2018)	Discrete event simulation of multimodal and unimodal transportation in the wood supply chain: A literature review	2018
LIN L; GEN M (2018)	Hybrid evolutionary optimisation with learning for production scheduling: state-of-the-art survey on algorithms and applications	2018
MAO Q; HU F; HAO Q (2018)	Deep learning for intelligent wireless networks: A comprehensive survey	2018
MAXWELL AE; WARNER TA; FANG F (2018)	Implementation of machine-learning classification in remote sensing: An applied review	2018
MOSAVI A; OZTURK P; CHAU KW (2018)	Flood prediction using machine learning models: Literature review	2018
SAFDAR S; ZAFAR S; ZAFAR N; et al. (2018)	Machine learning based decision support systems (DSS) for heart disease diagnosis: a review	2018
WANG Y; WANG L; RASTEGAR-MOJARAD M; et al. (2018)	Clinical information extraction applications: A literature review	2018
BERMEJO JF; FERNÁNDEZ JFG; PINO R; et al. (2019)	Review and comparison of intelligent optimization modelling techniques for energy forecasting and condition-based maintenance in PV plants	2019
BRADLEY A; VAN DER MEER R; MCKAY C (2019)	Personalized Pancreatic Cancer Management: A Systematic Review of How Machine Learning Is Supporting Decision-making	2019
CHAUHAN VK; DAHIYA K; SHARMA A (2019)	Problem formulations and solvers in linear SVM: a review	2019
FAZERES-FERRADOSA T; TAVEIRA-PINTO F; ROSA-SANTOS P; et al. (2019)	A review of reliability analysis of offshore scour protections	2019
GIRI C; JAIN S; ZENG X; et al. (2019)	A Detailed Review of Artificial Intelligence Applied in the Fashion and Apparel Industry	2019
HASSANAT A; ALMOHAMMADI K; ALKAFWEEN E; et al. (2019)	Choosing mutation and crossover ratios for genetic algorithms-a review with a new dynamic approach	2019
LAMBORA A; GUPTA K; CHOPRA K (2019)	Genetic Algorithm- A Literature Review	2019
MOSCATO P; MATHIESON L (2019)	Memetic Algorithms for Business Analytics and Data Science: A Brief Survey	2019
MUJTABA G; SHUIB L; IDRIS	Clinical text classification research trends: Systematic literature review	2019

N; et al. (2019)	and open issues	
NENNI ME; SFORZA A; STERLE C (2019)	Sustainability-based review of urban freight models	2019
OKWU MO; NWACHUKWU AN (2019)	A review of fuzzy logic applications in petroleum exploration, production and distribution operations	2019
PATLE BK; BABU L G; PANDEY A; et al. (2019)	A review: On path planning strategies for navigation of mobile robot	2019
RAHMANIFARD H; PLAKSINA T (2019)	Application of artificial intelligence techniques in the petroleum industry: a review	2019
SHRESTHA A; MAHMOOD A (2019)	Review of deep learning algorithms and architectures	2019
WANG W; ZHENG VW; YU H; et al. (2019)	A survey of zero-shot learning: Settings, methods, and applications	2019
XIE J; RICHARD YU F; HUANG T; et al. (2019)	A survey of machine learning techniques applied to software defined networking (SDN): Research issues and challenges	2019
XU F; USZKOREIT H; DU Y; et al. (2019)	Explainable AI: A Brief Survey on History, Research Areas, Approaches and Challenges	2019
ZARTE M; PECHMANN A; NUNES IL (2019)	Decision support systems for sustainable manufacturing surrounding the product and production life cycle – A literature review	2019
AGOSTINI A; BORGHERESI A; BRUNO F; et al. (2020)	New advances in CT imaging of pancreas diseases: a narrative review	2020
AHMED R; SREERAM V; MISHRA Y; et al. (2020)	A review and evaluation of the state-of-the-art in PV solar power forecasting: Techniques and optimization	2020
BURGGRÄF P; WAGNER J; KOKE B; et al. (2020)	Approaches for the Prediction of Lead Times in an Engineer to Order Environment-A Systematic Review	2020
HALAWA F; MADATHIL SC; GITTNER A; et al. (2020)	Advancing evidence-based healthcare facility design: a systematic literature review	2020
HAN Y; WU H; GENG Z; et al. (2020)	Review: Energy efficiency evaluation of complex petrochemical industries	2020
JI B; BANHAZI T; PERANO K; et al. (2020)	A review of measuring, assessing and mitigating heat stress in dairy cattle	2020
LIM WYB; LUONG NC; HOANG DT; et al. (2020)	Federated Learning in Mobile Edge Networks: A Comprehensive Survey	2020
MOTAHHIR S; EL HAMMOUMI A; EL GHIZAL A (2020)	The most used MPPT algorithms: Review and the suitable low-cost embedded board for each algorithm	2020
QI M; MAK HY; SHEN ZJM (2020)	Data-driven research in retail operations—A review	2020
REZAMAND M; KORDESTANI M; CARRIVEAU R; et al. (2020)	Critical Wind Turbine Components Prognostics: A Comprehensive Review	2020
ABDAR M; POURPANAH F; HUSSAIN S; et al. (2021)	A review of uncertainty quantification in deep learning: Techniques, applications and challenges	2021
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DANI T (2026)	Recent trends in optimization and integration process on biohydrogen production from food waste: A review	2026
DAS IJ; SAMAL HB; NAYAK P; et al. (2026)	Machine learning in tissue engineering: a comprehensive review of applications, challenges, and prospects	2026
DAVOODI S; MAKAROV N; WOOD DA; et al. (2026)	A review of artificial intelligence techniques applied to subsurface oil and gas reservoir simulation	2026
DEBBARMA R; LODH BK; BANDYOPADHYAY TK; et al. (2026)	Plastic pollution and its global environmental impacts: a comprehensive review of microbial biodegradation mechanisms, plastic-degrading enzymes, emerging biotechnological strategies and artificial intelligence-driven approaches for sustainable plastic waste management	2026
DEHGHANI M; AZAD Z; ERISIAN Z; et al. (2026)	Advancing sustainability through eco-design in the circular economy: A bibliometric analysis	2026
DHANDE SS; MANKOSKAR	Critical Review on Microbial Inulinase Production: Emerging Strategies,	2026

NA; PANAKKAL HP; et al. (2026)	AI-Driven Optimization, and Applications	
DOTE PARDO JS (2026)	Artificial intelligence for sustainable and circular textiles: a systematic literature review	2026
DUBEY AK; KUMAR A; SEGOVIA RAMÍREZ I; et al. (2026)	Machine learning and hybrid intelligence for wind energy optimization: A comprehensive state-of-the-art review	2026
DÍAZ-TATO L; ITURRALDE CARRERA LA; MARTÍNEZ ÁNGELES H; et al. (2026)	Artificial Intelligence for Sustainable Ceramic and Refractory Materials: A PRISMA-Guided Systematic Review of Emerging Design Strategies, Industrial Applications, and Circular Raw Material Utilization	2026
EL-SAADONY MT; SAAD AM; FAHMY MA; et al. (2026)	Flavonoids: biological activities, nutritional and immunological aspects, therapeutic potential, food applications, and human health benefits—A comprehensive review	2026
ESCANDÓN-PANCHANA P; MARTÍNEZ-CUEVAS S; SANCLEMENTE ORDOÑEZ E; et al. (2026)	Review of artificial intelligence in the agricultural cadastre: transforming agro-territorial management for global sustainability	2026
FARAJPOUR M (2026)	Artificial intelligence applications in medicinal and aromatic plants: a review of cultivation, phytochemical profiling, drug discovery, and processing energy	2026
FAVAS R; ALMEIDA H; PEIXOTO AF; et al. (2026)	Quality-by-design in the scale-up of lipid-based nanocarrier formulations: a review	2026
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GESESE TN; MERSHA DA; ADMASE AT; et al. (2026)	Biohydrogen Production Pathways: An Integrated Review of Feedstock Utilization, Technological Developments, Computational Modeling, and Emerging Prospects	2026
GHAEDRAHMATI A; ZANDI M (2026)	Advanced three-dimensional culture technologies in reproductive medicine: A narrative review	2026
GHASEMZADEH K; JAFARI M; TORABI T; et al. (2026)	Hybrid models, digital twins, and digital shadows for sustainable membrane technologies: A critical review	2026
GONZALEZ J; WANG J (2026)	Optimizing Biomass Feedstock Logistics Using AI for Integrated Multimodal Transport in Bioenergy and Bioproduct Systems: A Review	2026
GRYZLOV A; ARSALAN M (2026)	Multiphase measurements and virtual flow metering in the petroleum industry: a review	2026
GUNAWARDHANA T; ARANDIYAN H; DUAN XA; et al. (2026)	Upcycling end-of-life lithium-ion battery into electrocatalysts - Turning waste into value: A review	2026
GUPTA J; KUMAR R (2026)	A comprehensive review on artificial intelligence driven approaches for vaccine development: Current advances, challenges, and future prospects	2026
HALLIOUI A; PEDRONI N (2026)	Enhancing the Resilience and Sustainability of Integrated Energy Systems Exposed to Extreme Natural Hazards by Means of Artificial Intelligence, Advanced Simulation, and Optimization Methods, Within an Integrative Systems Framework: A Critical Review of Literature	2026

HAN F; QIAO J; LI J; et al. (2026)	Review on Applications and Prospects of Federated Learning in New Power Systems	2026
HASAN MZ; IQBAL SMF; KHAN A; et al. (2026)	Review: biomass-derived nanocellulose for sustainable food systems—from green production to advanced functional applications	2026
HASSAN OH; ABDELREHIM O; SALEM MS; et al. (2026)	Sustainable thermodynamic innovations and energy-efficient hybrid designs in Humidification–Dehumidification (HDH) desalination: A comprehensive review	2026
HASSAN SU; SYED MW; KAZMI WW; et al. (2026)	A Life Cycle Assessment Review of Climate Impacts from Low-Carbon Hydrogen Production Technologies	2026
HASSANEN SM; SEID AHMED Y; AL MOMANI B; et al. (2026)	A review of additive manufacturing techniques for wind turbine blade production: capabilities, AI integration, and Scale-Up Potential	2026
HUANG J; ZHAO Q; LI R; et al. (2026)	Nutritional Functional Properties and Exploitation of Oyster Shells: A Research Review	2026
HUANG K; LIN Z; WANG Y; et al. (2026)	Artificial Intelligence for Food Packaging: A Life Cycle–Oriented Review of Material Performance, Functionality, Safety, and Sustainability	2026
HUMERA FARHEEN V; ASLAM ABDULLAH M; GANESH MOORTHY I (2026)	Lignocellulosic bioethanol production: a review on pretreatment strategies, biofuel separation, and artificial intelligence/machine learning – based sustainable optimization	2026
IDNANI R; KHAN S (2026)	Engineering the future of organ transplantation: A comprehensive review of 3D bioprinting advances for organ bioengineering	2026
IKHMAL SALEHMIN MN; KIONG TS; MOHAMED H; et al. (2026)	Modeling biohydrogen production from microbial electrolysis cells in the machine learning era: a review	2026
JAYABAL R; MEHAR K; C G R; et al. (2026)	Microwave-assisted waste valorization for hydrogen and carbon nanomaterials: A critical review	2026
KABIR M; LÓPEZ-CORTÉS I; FERRER-GISBERT C; et al. (2026)	From Upstream Assessment to Downstream Energy Conversion: A Systematic Review of Advances in Biomass Residue Utilization Techniques	2026
KARMAKAR A; SHAHRIAR HOSSAIN MA; HASAN EMON MF; et al. (2026)	Digital assisted hydrogen supply chain optimization: a bibliometric and thematic review of methods, trends, and future directions	2026
KAVUBA HP; WU Z; JIANG S; et al. (2026)	Recent advances in AI-driven production prediction for highly heterogeneous reservoirs: A comprehensive review	2026
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KRAIPIYASET P; NEAMCHUCHUEN T; CHANPRAMUN S; et al. (2026)	Agentic AI-driven creative media management in mass communication Education 5.0: A PRISMA-guided mixed-methods systematic review and bibliometric analysis	2026
KUMAR A; BHASKAR M; KUSHWAHA A; et al. (2026)	Integrative approaches of plant growth-promoting microbes, CRISPR/Cas gene editing, and AI/ML technologies for abiotic stress alleviation and support climate-resilient agriculture: A review	2026
KURNIA D; SUTANTO A; FAKHRURROJA H (2026)	AI and IoT for Yarn Defect Detection in the Textile Industry: A Systematic Literature Review	2026

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LÉVANO D; PINEDO L; VIZALOTE G; et al. (2026)	Application of artificial intelligence techniques in the aquaculture sector: Systematic review of the American context	2026
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MA'MANI L; SALAHSHOUR S; YOUSEFIBASER Z; et al. (2026)	From Artificial Intelligence to Intelligent Nanoagriculture: A Systematic Review on AI-Powered Agriculture and Future Perspective on AI-Driven Nanoagriculture	2026
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MAGHRAOUI AE; LAAYATI O; HADRAOUI HE; et al. (2026)	From renewable integration to digital transformation: A systematic review of Morocco's smart grid transition	2026
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MARTÍN MONCUNILL D;	Possibilities of Artificial Intelligence in Sports Refereeing: An	2026

SAMPEDRO LIRIO D; BRAVO HIJÓN MÁ (2026)	Exploratory Study Contrasting the Literature Review with Expert-Perceived Opportunities	
MAYO-ALVAREZ L; CÓRDOVA-MARAVÍ J; GARCÍA-GÓMEZ D; et al. (2026)	Technological Trends in Lean Construction for Engineering Design Improvement and Productivity in Civil Engineering Projects: A Systematic Literature Review	2026
MEHTAB A; MUN HS; LAGUA EB; et al. (2026)	AI-Driven smart farming for energy optimization in broiler production: A review of PCM-based cold thermal energy storage systems	2026
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MIRZAEI A; PAZHOUHAN M; REZANEJAD K; et al. (2026)	A review of artificial intelligence methodologies in marine renewable energy technologies	2026
MOGASHANE TM; MOTLATLE MA; MOKOENA L; et al. (2026)	Smart recovery of rare earth elements from acid mine drainage: Current methods, machine learning integration, and bibliometric analysis	2026
MOHAMMADPOUR M; MOHAMMADPOUR A (2026)	MOF/COF architectures and artificial intelligence-driven design for next-generation electrolyzers: A comprehensive review of hydrogen production and CO ₂ reduction	2026
MOHAN BABU A; MADHAN ES (2026)	Human digital twins in personalized and predictive healthcare: a comprehensive review of technologies, applications, and future directions	2026
MOHARRAM NA; IBRAHIM MM; SHEHATA AI; et al. (2026)	Beyond conventional desalination: A critical review of multigeneration systems and emerging pathways for sustainable water production	2026
MOTAEI E; GANAT T; TABATABAI M; et al. (2026)	Advancements in Machine Learning–Driven Proxy Modelling Techniques for Reservoir Engineering: A Systematic Review	2026
MURALI R; BYWATER A; DOLAT M; et al. (2026)	Anaerobic digestion site-wide optimisation and decision-making: An industrial perspective and review	2026
NABEEL MI; QASIM M; SAJID M; et al. (2026)	MXene/g-C ₃ N ₄ hybrid systems: Strategies for the development of multiple applications with artificial intelligence-driven optimization: A comprehensive review	2026
NAGAPPAN B; REDDY KN; PATEL P; et al. (2026)	Renewable Hydrogen storage pathways for decentralized energy systems in remote Indian communities: A review of technologies, optimization strategies, and policy perspectives	2026
NGO TH; KHIEU HH; ZHANG Y; et al. (2026)	Achieving low-carbon buildings through advancing concrete materials and automated construction: A review	2026
NIYAZI S (2026)	Global advances in biohydrogen production: A systematic review synergizing nanotechnology, genetic engineering, and AI for sustainable energy	2026
NKIKO CM (2026)	Behavioural Sustainability and Artificial Intelligence: A Multi-Level Systematic Review of the Intention–Behaviour Gap and Decoupling	2026
NOMAN S; MAHAPATRA S; DEY B (2026)	Passive and active augmentation techniques for tubular solar still desalination systems: A comprehensive review on performance enhancement, sustainability, thermo-economic assessment, and future	2026

	perspectives	
NYANGIWE NN; KENFACK ADK; THANTSHA N; et al. (2026)	Performance Monitoring of Photovoltaic Modules Using Machine-Learning-Based Solutions: A Survey of Current Trends	2026
OGUNKUNLE O; UCHE E; OKERE KI; et al. (2026)	Low-carbon energy production for sustainable development: a bibliometric analysis and SWOT appraisal of artificial intelligence contributions	2026
OH S; PARK Y; PARK S; et al. (2026)	Continuous flow chemistry for the synthesis of highly energetic materials: A review of synthetic advancements, process intensification, and safety engineering	2026
OKESANYA OJ; HASSAN MM; ADEBAYO UO; et al. (2026)	Artificial intelligence and machine learning across vaccine lifecycle: a systematic review	2026
OLATUNDE NA; ANUGWO IC; AWODELE IA; et al. (2026)	Unpacking trends in artificial intelligence research in the construction industry: a bibliographic review	2026
OMIGBODUN FT (2026)	AI-Driven Digital Twins in Sustainable Manufacturing: A Critical Review	2026
OROZCO JL; BASADRE JA (2026)	Artificial Intelligence-Driven Circular Economy Initiatives: A Global Bibliometric Analysis of Research Trends, Knowledge Structures, and Future Directions	2026
PAN C; ZHOU X; CHEN Z; et al. (2026)	Artificial intelligence in copper metallurgy: A review of collaborative cross-process optimization	2026
PANDEY AK; KAUR H; GAUR NA (2026)	Advanced approaches for mitigating impact of pre-treatment generated inhibitors in lignocellulosic hydrolysates: A comprehensive review	2026
PATEL SS; SHREE T; KUMAR A (2026)	Microbial consortia interactions and bioremediation of pesticides: A review on designing, mechanism and efficacy	2026
PATIL R; BORUGADDA VB; ACHARYA B; et al. (2026)	A Review of North America's Evolving Renewable Natural Gas Market in a Global Context	2026
PATIL S (2026)	Artificial Intelligence and Machine Learning Applications in the Textile Industry: A Review	2026
PINHEIRO GS; DI DOMENICO M; BONFIM-ROCHA L; et al. (2026)	From biomass to jet fuel: A systematic review of modeling and simulation approaches for SAF production	2026
PUTRA NR (2026)	Valorization of palm waste residues in Indonesia: A review	2026
PUTRA RDE; FITRI TZ; SHAI K; et al. (2026)	Impact of IoT Technology Implementation in the Manufacturing Sector: A Systematic Literature Review	2026
QI N; HE L; SHI M; et al. (2026)	Unlocking straw biomass potential: A comprehensive review on alkali-urea pretreatment to enhance anaerobic digestion	2026
RABAH M; ALI L; RAZA M; et al. (2026)	Review on Carbonaceous Catalysts for Transesterification of Feedstock Toward Biodiesel Production: Advances, Challenges, and AI Perspectives	2026
RAHMAN N; OMAR MB; NOR NBM; et al. (2026)	Data-driven predictive modeling and optimization of biomimetic wave energy converters: A review with focus on Malaysian marine environments	2026
RAJENDRAN S; PALANI G;	A review on AI integration with FDM printing to enhance precision,	2026

SANJEEVI S; et al. (2026)	efficiency, and process optimization	
RAMANDANI AA; LAN JCW; LIM JW; et al. (2026)	Artificial intelligence-driven and prediction of green biohydrogen derived from microalgae biorefinery: A review	2026
RANI A; GOEL A; CHAUHAN A; et al. (2026)	Smart valorization of food waste for sustainable bioenergy production: a review of emerging technologies and policy strategies	2026
RASHID FL; AL-OBAIDI MA; ABDALRAHEM MK; et al. (2026)	Advances in solar drone technology: a multi-disciplinary review of aerodynamics, energy systems, AI-driven monitoring, and applications	2026
RATH GK; PALENCIA JDG; DALAI AK (2026)	A Comprehensive Review on Biomass Valorization Through Thermochemical Pathways: Product Properties and Usage of Artificial Intelligence	2026
RATHOD D; GIDWANI L (2026)	A literature review based on density forecasting and uncertainty quantification of wind power generation	2026
REZA MS; FATTAH IMR; WANG J; et al. (2026)	Hydrogen-based hybrid energy system: A review of technologies, optimization approaches, objectives, constraints, applications, and outstanding issues	2026
RODRIGUEZ-FERNANDEZ IC; JURADO-VERA SY; RAMOS-CAVERO MJ; et al. (2026)	Digital Transformation and Operational Efficiency in Fast-Moving Consumer Goods Companies: A Systematic Review of Industry 4.0 Applications	2026
RONGER W; JIGANG W (2026)	Review of Image-Point Cloud Fusion Research for AGV Environment Perception	2026
ROY S; CHAKRABORTY S; RAKHSHIT S; et al. (2026)	Insects-Derived Antifungal Peptides and Compounds: A Review of Their Potential and Mechanisms	2026
ROZHOK A; ABATE R; MANOLI E; et al. (2026)	A Review of Recent Advanced Applications in Smart Manufacturing Systems	2026
SALEH HA; SABRI RK; ALSAIF OI (2026)	REVIEW OF EMERGING AI TECHNIQUES FOR GREEN HYDROGEN IN SUSTAINABLE ENERGY	2026
SAMBHAVI Y V; ANGALAESWARI S; PALANIAPPAN R; et al. (2026)	Hydrogen-powered electric vehicles: A state-of-the-art review	2026
SHABDIN MK; MIRYALA M; KECHIK MMA; et al. (2026)	Data-Driven Superconductivity: a Review of Machine Learning Methods for Material Discovery, Property Prediction, and Process Optimization	2026
SHAH H; MUNKWITZ SE; IGLESIAS NJ; et al. (2026)	A Review of Artificial Intelligence in 3D Printing. Part A: From Scaffold Design to Pre-Print Optimization	2026
SHAHEEN WHA; TOLEPHIH MH; ALSHARIFI T (2026)	Integrated finite element method, artificial intelligence, and digital twin technologies for drawing die design: A comprehensive review of advanced simulation and production efficiency optimization	2026
SHAN K; CONG L; YU Z; et al. (2026)	Artificial intelligence empowering geothermal energy development: A full-lifecycle review from exploration to operation	2026
SHARMA A; SALHOTRA S; RATHOUR RK; et al. (2026)	Recent developments in separation and storage of lignocellulosic biomass-derived liquid and gaseous biofuels: A comprehensive review	2026
SHARMA R; SINGHAL E (2026)	Generative AI and Creative Industries: A Systematic Review on Emerging Trends and Future Research Directions	2026
SHI J; LIU Q; WU T; et al.	Acoustic Stimulation for Enhanced Oil Recovery: A Review and Future	2026

(2026)	Directions	
SHRIVASTAVA P; MISHRA S; MAHATO KK; et al. (2026)	A comprehensive review on advanced materials and testing techniques for passenger vehicle frames	2026
SHU D; MA M; XU J; et al. (2026)	The strategies to improve the survival of spray-dried probiotics: A comprehensive review	2026
SINGH G; VASUDEV H (2026)	A Review on Smart Welding Systems: AI Integration and Sensor-Based Process Optimization	2026
SKUDLIK P; WRÓBEL A; PACZEK M (2026)	Review and Analysis of Methods for Separating Plastic Micro-Particles from Pipe Systems, Taking into Account Efficiency and Automation Potential	2026
SLAMANI M; LOUHICHI B; AMROUNE S; et al. (2026)	Next-Generation Composite Materials and Manufacturing: A Review of Smart, Sustainable, and Digital Advancements	2026
SOLEIMANI A; ABBASPOUR-FARD MH; SAPKOTA R; et al. (2026)	Artificial intelligence in agricultural machinery & robotics: A systematic review and future outlook	2026
SONG MK; KIM DW; MOHANTY S; et al. (2026)	Energy-efficient machine learning approaches for enhanced biofuel (Biodiesel) production: A review	2026
SOORI M; AREZOO B (2026)	Machine learning and AI-driven digital twins in manufacturing of advanced metal alloys and compounds: A review	2026
SUN M; CHEN N; LONG Y; et al. (2026)	Mechanisms and strategies for lignin-targeted pretreatment and β -glucosidase molecular engineering in enhancing cellulase hydrolysis efficiency: A review	2026
SUN S; ZHANG A; ZHANG R; et al. (2026)	Microbial biosynthesis of stilbenoids: A comprehensive review	2026
SYED A; GUO X; WANG N; et al. (2026)	Next-generation control for electrolyzers: a review of GPT-based AI frameworks in renewable hydrogen systems	2026
TABET W; BENFRIHA K; BOUNAB B (2026)	A review on integration of digital twins within industry 4.0	2026
TALEB MA; HUSI G; PÁLINKÁS S (2026)	Numerical Simulation of Die Forging Processes: A Review of Finite Element Modelling Approaches, Material Models and Process Parameters	2026
TAMILARASAN BS; KAVITHA R; SANKARI VS (2026)	Operational research pathways for sustainable fashion supply chains: a comprehensive bibliometric and TCCM review	2026
TIAN M; GUO H; LONG C; et al. (2026)	How large-scale foundation models benefit precision livestock farming: A survey	2026
TRABELSI N; REJEB A; COURIS S; et al. (2026)	Industry 4.0 in olive farming and oil production: A comprehensive review of technologies and trends	2026
USMAN MB; NAVEED S; NAZEER S; et al. (2026)	Navigating the intellectual terrain of AI–HRM integration: a bibliometric review (2000–2024)	2026
USMAN S; YE T; AHMED F; et al. (2026)	Job-shop scheduling with resource flexibility: A systematic review from traditional to AI-integrated approaches	2026
VAN DER LAAG R; RIZZATO A; BÄCK T; et al. (2026)	Machine learning for hydrogen technologies: A comprehensive review of challenges, opportunities, and emerging trends	2026
WAGLE SA; KULKARNI K;	Artificial intelligence driven sustainability in tomato supply chains	2026

ARUN S; et al. (2026)	optimization a systematic review	
WANG G; ZHONG L; ZENG Y (2026)	AI-Enhanced Evolutionary Game Theory for Intelligent Coordination and Adaptive Optimization in Low-Carbon Energy Systems: A Multi-Scale Review from Smart Grids to Carbon Markets	2026
WANG X; LIU W (2026)	From monitoring to generative intervention: The evolution of AI in exercise prescription – A bibliometric analysis	2026
WAWARE SY; SEETA Y; RUDRAKOTTI ARB; et al. (2026)	A COMPREHENSIVE REVIEW OF TREATMENT TECHNOLOGIES AND SUSTAINABLE MATERIALS IN ENVIRONMENTAL CHEMICAL ENGINEERING	2026
WU J; LI T; LI J; et al. (2026)	Horticultural Strategies for Enhancing Yield and Quality in Hydroponic Microgreens: A Comprehensive Review	2026
WU Y; FU X (2026)	Clean and Smart Energy Technologies for Agricultural Energy Internet Systems: A Comprehensive Review and Future Perspectives	2026
XU N; LIU B; GENG R; et al. (2026)	AI in cheese manufacturing: A comprehensive review of technologies, applications, and future prospects	2026
XU Q; CHEN H; XU L; et al. (2026)	Artificial Intelligence in Construction Supply Chains: A Scientometric Review and Future Research Agenda	2026
XU X; YANG Y; ZHANG S; et al. (2026)	Exploring the chemistry and craft behind coffee flavour underpinned by the growing coffee industry in China (Yunnan): A review	2026
YADAV S; CHANDRA H; TIWARI KS; et al. (2026)	A review on the role of artificial intelligence and data science in green and sustainable chemistry: current trends and futuristic pathways	2026
YANG L; ZHOU M; GUO W; et al. (2026)	A Comprehensive Review of Wooden Breast Myopathy in Broilers: Impacts, Detection, Processing, and Future Perspectives	2026
YAO L; GAO J (2026)	A Review of Non-Thermal Plasma Technology and Plasma–Artificial Intelligence Integration in Agriculture	2026
YOUSSEF SM; REHMAN S; ZAYED ME; et al. (2026)	A critical Review of Sustainable Additive Manufacturing Integrated Wind Power Systems: Configurations, Design Optimization, and Fault Detection AI Models	2026
YU J; SU E; WU J; et al. (2026)	Artificial intelligence and multi-scale data fusion for high-value utilization of whey proteins: A systematic review	2026
YU S; LI X; ZHAO S; et al. (2026)	Agricultural Intelligence: A Technical Review Within the Perception–Decision–Execution Framework	2026
YUAN YL; DAI JL; XIAO L; et al. (2026)	Advances in engineering microalgae for heterologous terpenoid synthesis: A review	2026
ZADMIRZAEI M; COZZI M; ROMANO S; et al. (2026)	Data envelopment analysis in forestry over three decades: an in-depth review of models and emerging directions	2026
ZHANG J; WANG J; FANG Y; et al. (2026)	Fabrication, Modification, and Applications of Functional Aerogels: A Review	2026
ZHANG J; ZHAO Y; DUAN X (2026)	Recent advances in applications and biosynthetic production of myo-inositol:A review	2026
ZHANG L; YANG FF; LIU JB; et al. (2026)	EXOSOMES IN TISSUE ENGINEERING AND CELL-FREE THERAPY: A COMPREHENSIVE REVIEW	2026
ZHANG S; ZHU Y; ZHAO Z; et al. (2026)	Multi-Source Perception, Intelligent Decision-Making, and Precision Control for Autonomous Agricultural Systems: A Comprehensive Review	2026

ZHANG T; WEN J; TANG Y; et al. (2026)	Empowering Chinese medicinal agriculture through AI-driven technologies: A comprehensive review	2026
ZHANG Z; LIU Y; ZUO J; et al. (2026)	A review of humic acid production from lignocellulosic biomass using hydrothermal methods: Mechanisms, optimization, environmental impacts, and perspectives	2026
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MOHANTY K; OLIVA J; ALFONSO P; et al. (2027)	Artificial intelligence in quartz beneficiation and high-purity quartz production: A review	2027
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SYED A; TENG Y; WANG N; et al. (2027)	A critical review of AI-driven design for multi-MW wind-to-hydrogen systems: Status, challenges, and roadmap	2027

III. RESEARCH METHODOLOGY

This study uses the methodology of systematic and bibliometric research to analyze the evolution, structure and future trends of research in relation to the topics of Artificial Intelligence (AI), Production and Optimization. This type of analysis is especially suitable for the current study since it allows researchers to analyze a huge number of scientific publications quantitatively and detect patterns of the development of the research area (Donthu et al., 2021). Instead of conducting just a traditional narrative review, the current study follows a structured approach to finding and selecting the publications for analysis.

A systematic approach makes it possible to gather the literature based on predetermined search and selection criteria and not on an arbitrary choice of the studies. In this case, the researcher reduces the potential bias in the process and gets a clear framework for retaining the publications for further analysis (Linnenluecke et al., 2020). Similarly, Paul et al. (2021) highlight the importance of systematic literature review methods to provide a clear rationale for the literature identification, classification and evaluation process.

The study uses the systematic selection method along with bibliometric analysis in order to examine the performance and intellectual structure of the research devoted to topic of AI and production and optimization. Bibliometric approaches help identify the most influential publications, authors, journals and research topics, whereas science mapping allows to identify the connections and clusters in the field of research (Donthu et al., 2021; Zupic&Čater, 2015. That is why the methodology used by the author is appropriate for such a wide and interdisciplinary topic as AI and Production and Optimization.

A. Article Selection, Inclusion & Exclusion Criteria

The literature search was carried out via the Scopus database with keywords as “Artificial Intelligence AND Production AND Optimization”. Scopus was chosen to be the bibliographic records source due to the fact that big academic bibliographic databases such as Scopus allow acquiring necessary bibliographic datasets for bibliometric analysis (Donthu et al., 2021). The purpose of the search was to acquire papers that consider the relationship between Artificial Intelligence and Production and Optimization.

The first search brought 8311 records. These records then underwent a series of filters connected with a period of publications, types of documents, language, and journals. The clear identification of inclusion and exclusion criteria is essentially in order to ensure objectivity in the selection of literature (Linnenluecke et al., 2020).

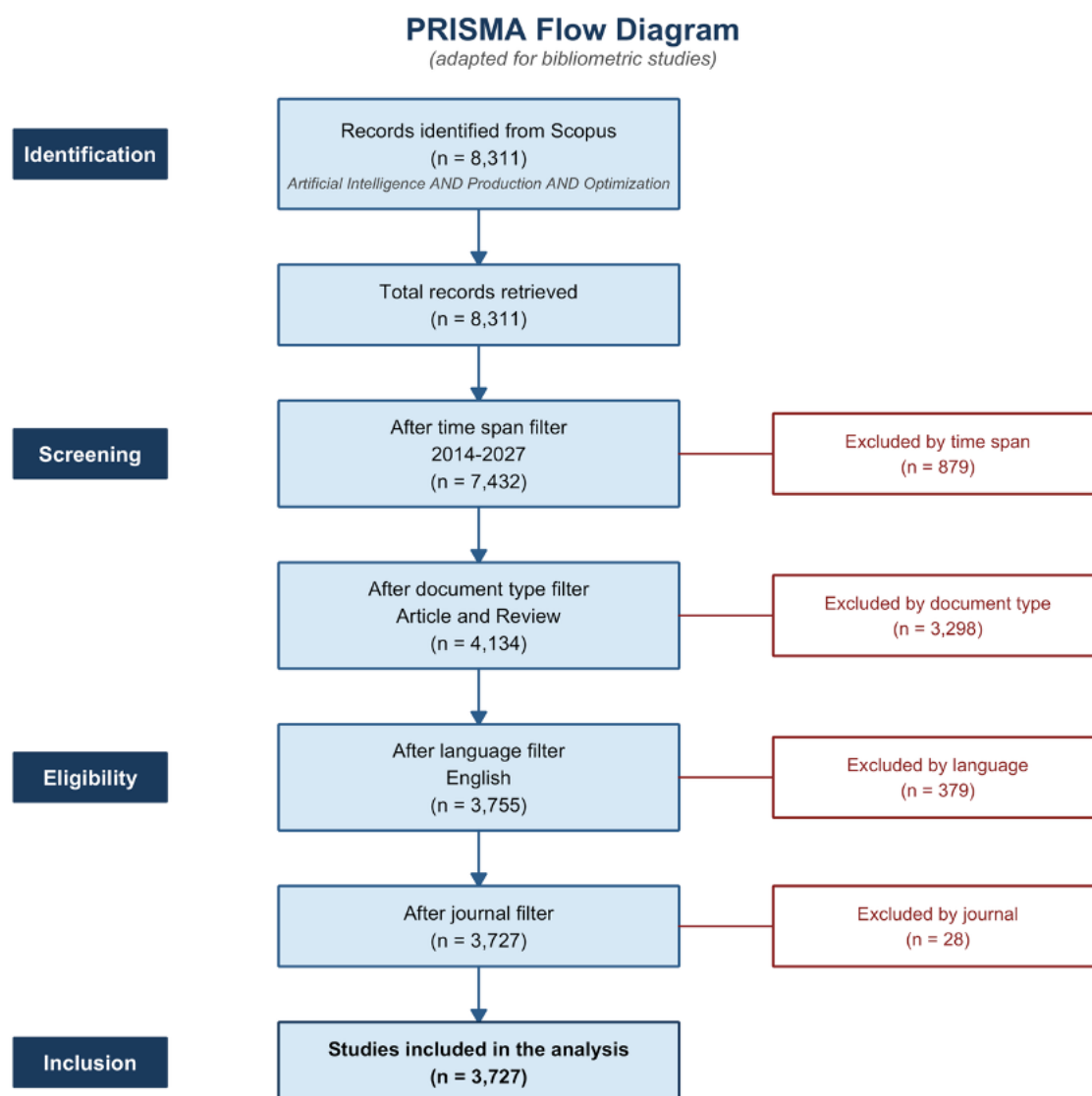
The initial filtering process entailed using the time span criteria from 2014 to 2027, after which 7432 documents were filtered. In the process, 879 documents outside the time span criteria were filtered out.

Thereafter, a document type filter was used in the process, and it entailed keeping 4134 documents. During the application of the document type filter, 3298 documents were filtered out. Language filtering was then done on the documents, whereby only those written in the English language were retained. On the basis of the criterion, 3755 documents were kept, while 379 were filtered out on the basis of language.

Finally, a journal filter was used on the documents. This led to the final dataset that had 3727 documents in total, whereby 28 were filtered out.

The process of identification and selection of articles was captured through PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. PRISMA is a systematic approach for reporting the identification, screening, eligibility and the inclusion of records as well as the number of records that have been excluded at various levels (Moher et al.,2010). It is a reporting guideline rather than a review methodology or a tool for assessing the quality of a review. The entire selection process of the current study is captured in Figure 1 showing how 8311 records identified through Scopus search were narrowed down to 3727 records.

Figure 1: PRISMA Flow Diagram



B. Bibliometric Analysis

A Bibliometric Analysis will be used quantitatively analyze the development, structure and emerging trends in research on Artificial Intelligence, Production and Optimization. This type of analysis is well suited for the topic being investigated in that it provides an efficient method to analyze the substantial amount of academic literature in terms of its evolution (Donthu et al., 2021). In addition a bibliometric approach helps assess the overall structure of the literature without conducting a detailed qualitative review of every single publication.

The analysis focuses on major bibliometric factors such as the trend in publication, citation, key author and journals, keywords, and research collaboration. The citation analysis can be used to important publications, authors, institutions and countries in the topic area under investigation. The co-citation analysis can be applied to identify the publications which are cited together and consequently, establish the intellectual basis of the research field. Bibliographic coupling is an analytical tool to identify publications which cite common references and thus, understand the structure of research in this area (Donthu et al., 2021).

Moreover, co-word analysis is applied to study the frequency of keywords' co-occurrence in order to find out the most important concepts and thematic clusters of the studies. Co-authorship analysis allows finding out collaboration partners between researchers, institutions, and countries. All of these approaches will help gain a better understanding of the development and intellectual structure of research on the junction of Artificial Intelligence, Production and Optimization (Donthu et al., 2021; Zupic&Čater, 2015).

The bibliographic data retrieved from Scopus were downloaded in BibTeX format and were analyzed through Biblioshiny/Bibliometrix and VOSviewer, while Microsoft Excel was used to organize the additional data. Bibliometrix is an open source R-based software developed for bibliometric and science mapping analysis, including data analysis and visualization (Aria & Cuccurullo, 2017). Thus, the analysis of the final dataset consisting of 3727 publications provides information about the leading researchers, the most significant studies, etc.

IV. DATA ANALYSIS

A. Introduction

This report looks at research on AI in production and optimisation. The data comes from Scopus. It was analysed with Bibliometrix, and the keyword maps were drawn in VOSviewer. Bibliometrix is an open source R tool built for science mapping (Aria & Cuccurullo, 2017). VOSviewer builds maps from bibliometric data. A bibliometric study counts and maps publications to show trends, main themes, and the most active authors and countries (Donthu et al., 2021). This report covers the main information, yearly output, country output, a three field plot, and keyword co-occurrence networks.

B. Data

The file has 3,725 documents from 2014 to 2027. Of these, 2,709 are articles (73%) and 1,016 are reviews (27%). The Scopus export has no cited references, so the reference count is zero. For this reason, analyses that need references, such as co-citation, could not be done.

C. Main information

Figure 1 shows the main information. The 3,725 documents come from 1,484 sources and were written by 12,416 authors. Only 222 authors wrote a document alone. The average is 4.74 co-authors per document, so most work is done in teams. International co-authorship is 31.17%, which means almost one in three documents has authors from more than one country. The data has 11,142 author keywords. The average document age is 2.23 years, so this is a young field. Each document has been cited 21.43 times on average, and the total is 79,822 citations.

The annual growth rate shows -6.44%. This number is misleading. The time span ends in 2027, and that year has only 16 documents, probably papers already set for 2027 issues. The rate compares the first and last year, so the small 2027 count pulls it below zero. If we compare 2014 (38 documents) with 2026 (1,161 documents), growth is about 33% a year.

The topic is also spread over many journals. The biggest sources are Applied Sciences (75 documents), Sustainability (62), IEEE Access (61), International Journal of Advanced Manufacturing Technology (52), and Energies (50). Even the top journal holds only 2% of all documents. The most cited paper is on digital twin shop floors in IEEE Access, with 1,385 citations (Tao et al., 2017).

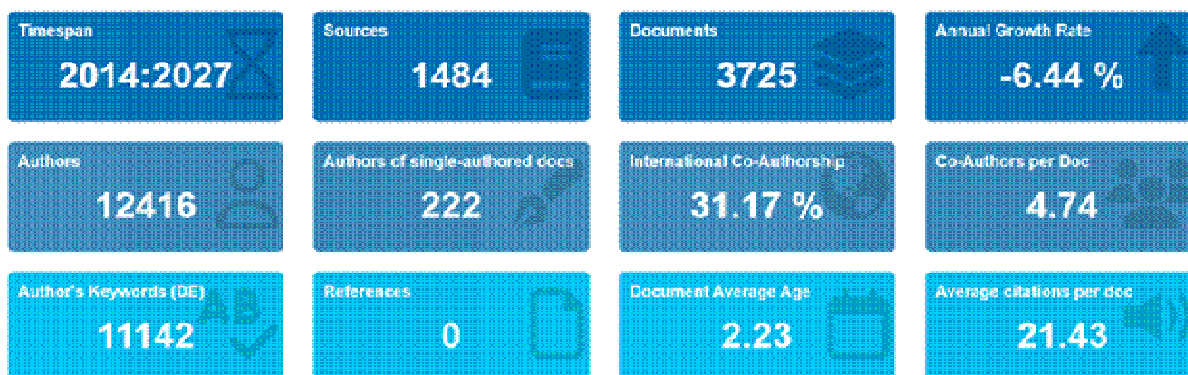


Figure 1. Main information about the dataset

D. Annual scientific production

Figure 2 shows the number of articles each year. From 2014 to 2018 output was small and steady, between 38 and 62 documents a year. It reached 84 in 2019 and 106 in 2020. After that the line rises faster: 162 in 2021, 231 in 2022, 312 in 2023, and 493 in 2024. The biggest jumps come next, with 899 in 2025 and 1,161 in 2026. These last two years together give 2,060 documents, which is 55% of the whole dataset.

The 2026 count is not final, because the data was exported on 11 September 2026. The full year will probably be higher. The drop to 16 in 2027 only shows how few papers carry that date so far. It does not mean interest is falling.

The dotted line is a straight trend line, and it fits badly. It sits above the real values in the middle years, below them at the end, and it goes under zero in 2014. Growth here is faster than a straight line, so this trend line should not be used to forecast. In simple words, the topic was quiet for years and then received a lot more attention.

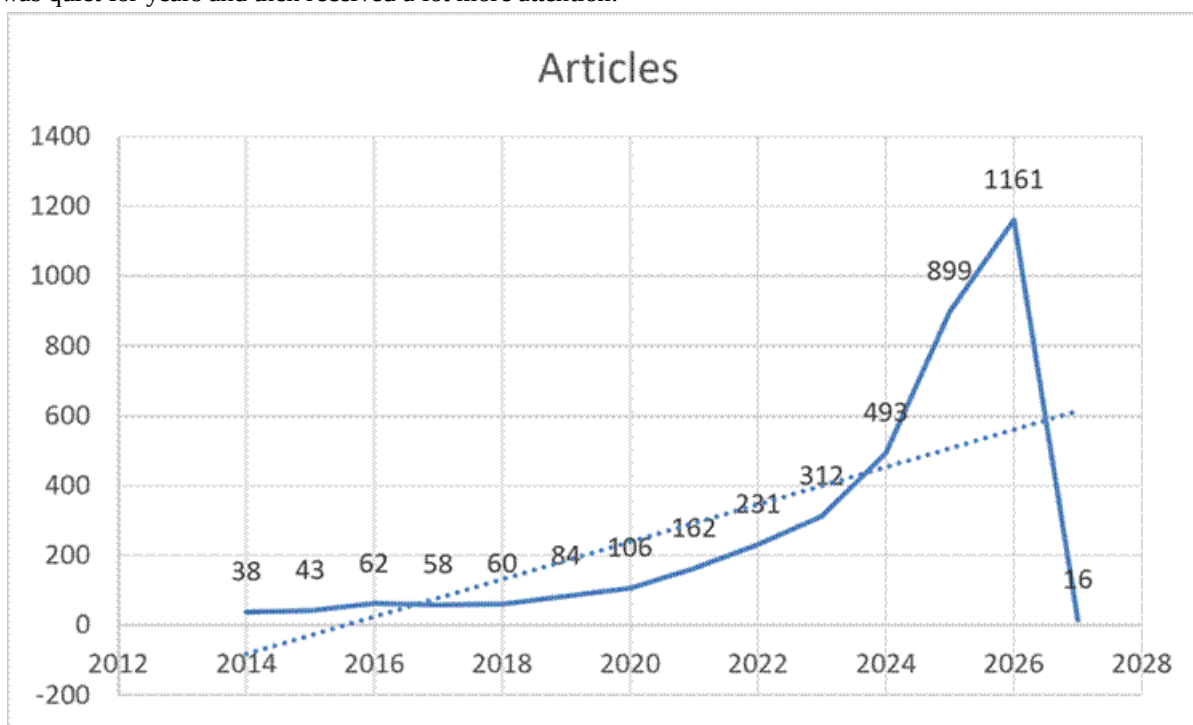


Figure 2. Annual scientific production

E. Country scientific production

Figure 3 is a world map where darker blue means more documents. China is the darkest, with 1,099 documents (about 30% of the dataset). India is next with 532, then the United States with 359. Saudi Arabia (213), Iran (189), the United Kingdom (174), South Korea (156), Spain (134), Italy (133), and Malaysia (130) follow.

These counts are documents with at least one author from that country, so a paper with authors from two countries counts for both. Six of the top ten countries are in Asia: China, India, Saudi Arabia, Iran, South Korea, and Malaysia. Europe and North America have many countries with medium output. Grey areas, such as Russia, Greenland, and parts of central Africa, mean little or no data. With 31.17% international co-authorship, the picture is that research is global, but a few large countries produce most of it.

Country Scientific Production

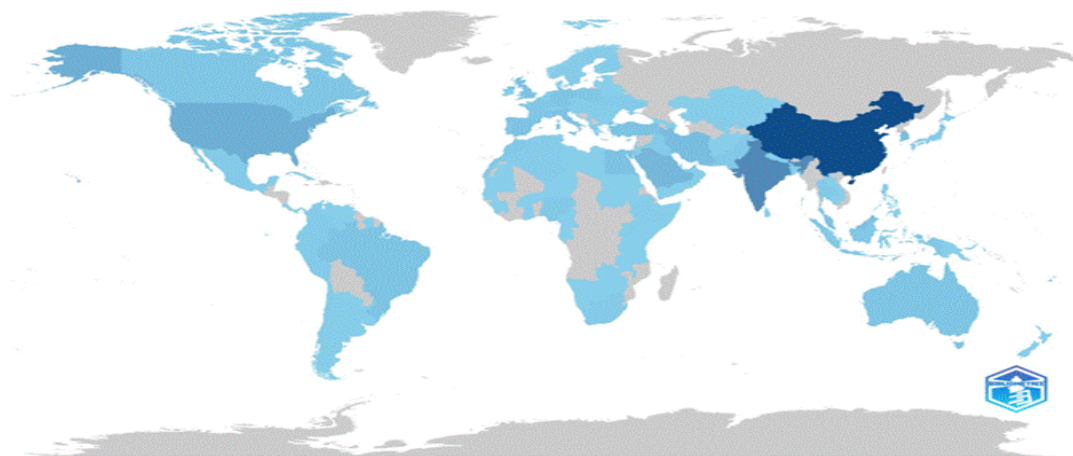


Figure 3. Country scientific production

F. Three field plot

The plot has the top 15 countries, the top 20 authors, and the top 15 keywords. Each box is one item, and its height shows how many links it has. A line joins two items when they appear in the same documents.

China is the biggest box on the left. Almost all of the top 20 authors have Chinese names, such as Wang Y (80 documents), Zhang Y (75), Wang X (57), Li Y (55), and Liu Y (54). Most of their links go to China. For example, 69 of the 80 Wang Y documents have at least one Chinese affiliation. One warning: Scopus lists authors as surname and initial, so Wang Y can be many different people. These counts are for groups of similar names, not single researchers.

On the right, artificial intelligence is the largest keyword (1,206 documents), followed by machine learning (566) and optimization (236). Deep learning (145) and industry 4.0 (121) come next. Lines from authors to keywords are spread out and cross a lot, so the same names write on many topics. The keywords artificial intelligence and artificial intelligence (ai) are counted apart, as in the raw data.

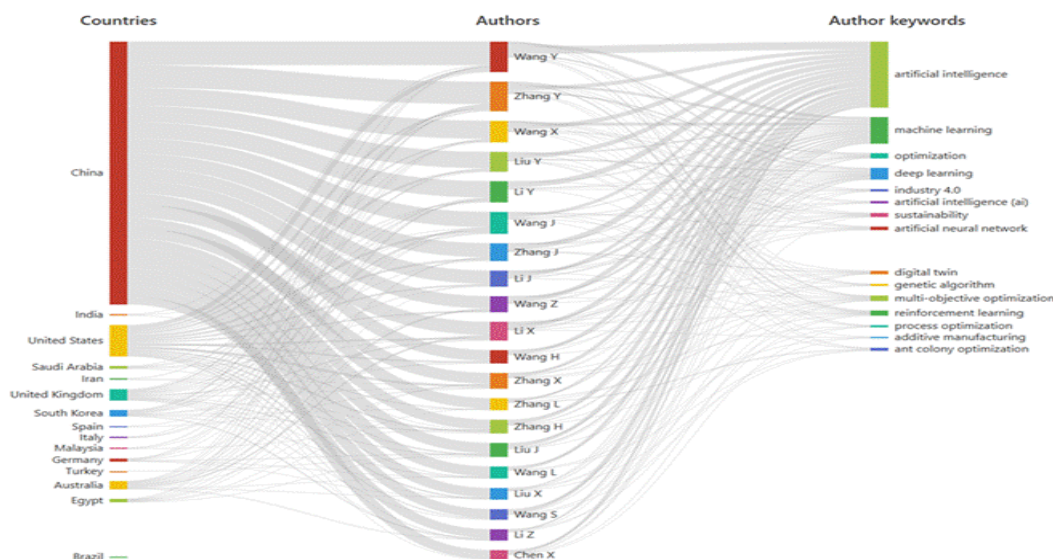
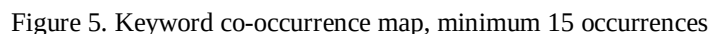


Figure 4. Three field plot: countries, authors, and author keywords

Figures 5 and 6 are VOSviewer maps of keywords. Each circle is a keyword, its size shows how often it appears, a line shows that two keywords appear together, and colours show clusters (van Eck & Waltman, 2010). Figure 5 uses a minimum of 15 occurrences, so it has many keywords. Figure 6 uses 30, so only the common ones stay.



With 30 occurrences (Figure 6), there are four large clusters and one very small one. Artificial intelligence is the biggest circle and sits in the middle, linked to every cluster.

The red cluster covers factory and decision topics: decision making, decision support systems, deep learning, digital twin, internet of things, industry 4.0, smart manufacturing, production control, and scheduling. The green cluster covers energy and environment: hydrogen production, renewable energy, biomass, biogas, life cycle, and sustainability. The yellow cluster holds optimisation methods: optimization, genetic algorithm, particle swarm optimization, artificial neural network, and forecasting. The blue cluster holds life science words: human, nonhuman, article, review, metabolism, biosynthesis, and drug development. The small purple group has crops and agriculture.

With 15 occurrences (Figure 5), the same core stays but splits into more detail, and six colours appear. The red cluster is now biotechnology and medicine: fermentation, metabolism, genetics, synthetic biology, and drug delivery system. Green holds bioenergy and waste words: biofuel, biogas, methane, biomass, waste management, and microalgae. Cyan is a separate energy group: hydrogen production, renewable energy, energy systems, wind power, and photovoltaics. Yellow holds optimization, neural networks, energy efficiency, swarm intelligence, and oil field development. Blue keeps industry topics: decision making, supply chains, scheduling, digital twin, industry 4.0, and internet of things. Purple holds machine learning, prediction, deep learning, convolutional neural network, computer vision, and image analysis.

The lower limit shows small niches, such as oil fields, wind turbines, and data privacy. The higher limit shows the main structure. Both maps agree on that structure: AI in the centre, with industry and decisions, energy and environment, life sciences, and optimisation methods around it.

H. Keyword co-occurrence network

Figure 7 is a simpler map with about 45 keywords in three clusters. Artificial intelligence is the largest node, followed by optimization and machine learning. The thickest lines join artificial intelligence with optimization and with machine learning, so these are the most frequent pairs.

The red cluster is about optimisation and energy: optimization, genetic algorithm, ant colony optimization, particle swarm optimization, multiobjective optimization, hydrogen production, renewable energy, energy efficiency, sustainable development, and decision making. The blue cluster is about learning and smart factories: machine learning, deep learning, reinforcement learning, learning systems, digital twin, internet of things, industry 4.0, smart manufacturing, automation, process control, and forecasting.

The green cluster has research article and life science words: humans, nonhuman, article, review, metabolism, controlled study, algorithm, prediction, process optimization, quality control, and artificial neural network. Put simply, optimisation links with energy, machine learning links with smart factories, and the third group links with data and study terms.

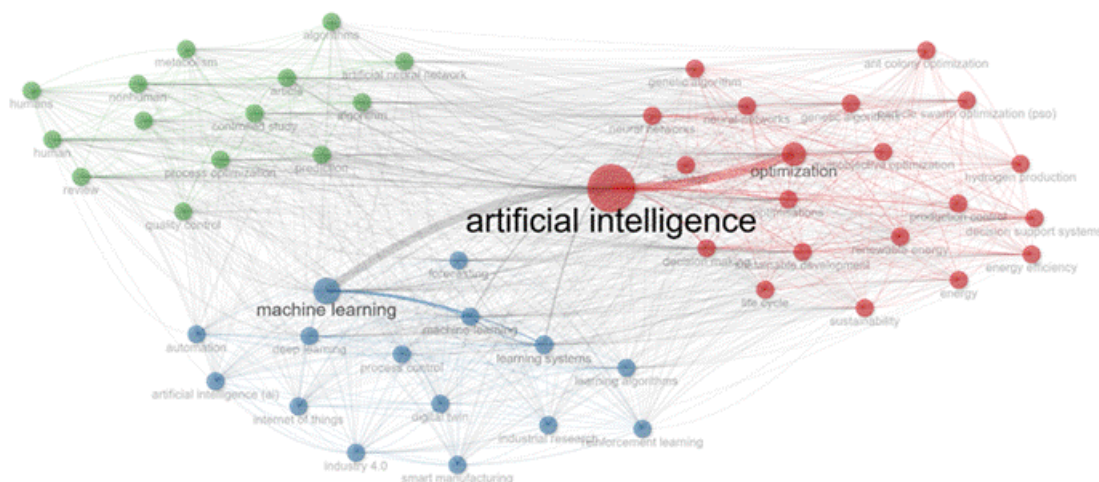


Figure 7. Keyword co-occurrence network

I. Conclusion

AI in production and optimisation is a young and fast growing field. Output went from 38 documents in 2014 to 1,161 in 2026, and more than half of all documents were published in the last two years. China leads by a wide margin, followed by India and the United States.

Research is spread over 1,484 sources and 12,416 authors, and about one in three documents has international authors. The keyword maps show artificial intelligence, machine learning, and optimization at the centre, with energy, smart manufacturing, and life sciences around them.

V. FUTURE RESEARCH AGENDA

The bibliometric and keyword evidence shows a field that has grown quickly without yet deepening what it decides. Output rose from 38 documents in 2014 to 1,161 in 2026, yet only 123 of the 3,719 records in the review corpus (3.3 per cent) mention a formal programming method, and only 20 name operations research as a discipline. Artificial intelligence, machine learning and optimization dominate every map, while the review found that learning is joined to a formal decision model mainly in scheduling (Esteso et al., 2023). The agenda that follows takes the four gaps identified in the review, together with the limits of the method used to find them. It asks for studies that move from prediction to prescription, treat uncertainty formally, place governance and resource cost inside the decision model, and test findings across settings with stronger bibliometric designs.

A. From Prediction to Prescription

The first priority is to test the point where the field currently stops. In predictive maintenance, quality control and digital twins, which have 89, 140 and 135 records, published work often ends at the failure forecast or the quality platform (Christou et al., 2022; Wahid et al., 2022). Danach et al. (2026) carry a forecast into a maintenance schedule, but the review found few comparable cases. The break is sharper in the small circles of the maps. Only two of 418 records on fermentation, metabolism, microalgae or bioprocesses record a formal programming method or model predictive control, and Murali et al. (2026) report that anaerobic digestion plants are mostly run on operator experience, with research centred on supply chains and laboratory cases rather than plant-level decisions. Elbadawi et al. (2020) predict printability from 614 formulations without scheduling the build queue, and food-chain studies detect contamination or forecast yield without routing a fleet (Dakhia et al., 2025; Kollia et al., 2021). A single well-specified study in one of these domains, such as a build-queue or batch-composition model for additive manufacturing, would advance the field more than another scheduling variant on a simplified shop.

Such studies need a stronger standard of evidence. Esteso et al. (2023) found that reinforcement learning is applied mainly to production scheduling, usually with model-free, single-agent algorithms in simplified environments, so the advantage of learned policies over tuned exact solvers on realistic instances is not established. Future work should compare any learned policy with an exact or heuristic benchmark, not only with another learning policy, and should report solution quality, computing time and feasibility. The syntheses of Usman et al. (2026) and Prata et al. (2024), on job-shop and constraint-programming scheduling, indicate the methods against which such comparisons can be drawn. Hybrid designs deserve the same test. Boresta et al. (2024) and Vaz et al. (2024) keep the optimisation model and use learning to forecast cost or demand, and future studies could compare such hybrids directly with end-to-end learned policies, such as that of Y. Zhang et al. (2022), on the same instances.

B. Giving Uncertainty a Formulation

The second priority is to treat uncertainty explicitly. The corpus holds nine records on robust optimization and four on vehicle routing, against 107 on reinforcement learning, a balance that does not match the disturbances found in plant data. Robust treatments exist but are scarce: R. Zhang et al. (2020) address hot-rolling schedules, and Ajagekar et al. (2023) place robust optimisation inside a deep reinforcement learning controller for greenhouses. Y. Zhang et al. (2022), by contrast, meet stochastic order and resource disturbances through a learned multi-agent policy. Future research should ask when a stated uncertainty set or stochastic formulation outperforms learned adaptation, and when combining the two is better. Studies should name the source of uncertainty, whether demand, failure, yield or resource availability, state how it is modelled, and test feasibility under disturbance, particularly in bioprocess and food settings where the review found little formal treatment. Reporting results across several disturbance levels, not a single nominal case, would also make findings easier to compare.

C. Governance as Part of the Decision Model

Third, explainability, human oversight and privacy-preserving coordination should move from separate keywords to elements of the decision model. Explainable artificial intelligence has 61 records and human-in-the-loop only four, and the literature mostly treats them on their own. Nguyen et al. (2025) find explainable methods limited in additive manufacturing, Tóth et al. (2023) outline a human-centric Industry 5.0 collaboration architecture, and Yang et al. (2022) apply federated learning to industrial internet-of-things services. Danach et al. (2026) show one route by pairing an explainable framework with maintenance scheduling.

Future studies could model which decisions need human approval, what explanation a planner requires, or which data cannot leave a site, and then measure what each requirement costs in solution quality. This would turn explainability from a label into a measurable design choice. Martini et al. (2024), who name additive manufacturing as a case for human-centred Industry 5.0, suggest a suitable test domain.

D. Counting the Resource Cost of the Model

Fourth, the objective should include the resource cost of the model itself. Tsolakis et al. (2022) report little work on the environmental cost of AI-enabled decision support in logistics, and Wheeler (2026), drawing on 73 empirical studies, finds that the environmental outcomes of AI vary tenfold to sixtyfold across regions. A method that ignores this cost may therefore rank actions differently in different places. Future research should add the resource cost of training and running the model, such as energy use, to the objective or constraint set, with regional parameters, and test whether the ranking of methods changes once it is counted. Reporting that cost beside accuracy and solution quality would give readers a fuller basis for choosing between methods.

E. Holding Newer Methods to the Same Standard

Large language models are among the fastest-growing labels in the corpus, with 77 of 122 mentions dated 2026. Chen and Huang (2025) combine them with reinforcement learning for crop production, Božejko et al. (2026) pair autonomous AI with quantum computing for a two-machine scheduling problem, and Ajagekar and You (2022) survey quantum artificial intelligence for sustainable energy. These studies extend the method set but do not yet supply the missing plant-level decision models. Future work should show that such a tool improves a stated decision against a benchmark, handles uncertainty, and reports its resource cost, rather than treating novelty as the contribution.

F. Context and Comparability

The geography of the file also calls for care. China accounts for 1,099 documents, about 30 per cent of the file, followed by India with 532 and the United States with 359, and six of the top ten countries are in Asia. Because a country count records where at least one author is based, it says little about where the studied plants operate. Future studies should report the production setting and region, and ask whether the same scheduling or maintenance model transfers between settings or needs local recalibration, especially given the regional variation reported by Wheeler (2026). With 31.17 per cent international co-authorship, multi-country teams are well placed to test one model on plants in more than one setting, and the grey areas of the country map, which mean little or no data, mark regions where this file holds little evidence.

G. Methodological Development for Future Reviews

Finally, the limits of this review define the next bibliometric work. The search used one database and one Boolean string (Donthu et al., 2021), and conference papers fall outside the set. Because the export holds no cited references, co-citation and bibliographic coupling could not be run, and the intellectual base of the field was not identified (Zupic&Čater, 2015). Later reviews should add a second database such as Web of Science, include conference papers, and export cited references. Since only 3.3 per cent of records use programming terminology, a search string that adds scheduling and programming terms could better capture studies that join learning to decision models. Author labels such as Wang Y are name groups, and keyword variants such as 'artificial intelligence' and 'artificial intelligence (ai)' were counted apart, so future work should disambiguate authors and merge keywords with a thesaurus. The 2026 total is incomplete, so the analysis should be repeated once the year closes, with 2027 treated separately. Because the maps show vocabulary, not decision quality, bibliometric mapping should be paired with qualitative coding of the small-circle studies, and with a quality appraisal that PRISMA does not provide (Moher et al., 2010). Fixing the search, filters and export procedure in advance would keep later studies comparable (Linnenluecke et al., 2020).

H. Summary

Taken together, these directions respond to one pattern: the field has many forecasts and few recommended actions. The next useful contribution is therefore not another map of the same three keywords. It is a study set in one of the under-served domains that recommends an action, states its uncertainty, includes governance and resource costs, and is tested against an exact or heuristic decision model on realistic instances. By combining such empirical work with a more complete bibliometric design, future research can show where learning has genuinely improved production decisions, rather than where it has simply been mentioned alongside optimization.

VI. CONCLUSION

The four questions have a single answer. Output was small from 2014 to 2018 and then rose sharply, with more than half of the documents dated 2025 or 2026. China accounts for about 30 per cent of the file, and authorship is concentrated in a few surname-and-initial groups. The keyword maps place artificial intelligence in the centre, with industry and decisions, energy and environment, life sciences, and optimisation methods around it. Formal decision models appear mainly in scheduling (Esteso et al., 2023; Zhang et al., 2023). In bioprocess, additive manufacturing, and food systems, the published work more often stops at a prediction (Elbadawi et al., 2020; Kollia et al., 2021; Murali et al., 2026).

The performance file makes the growth concrete without supporting a forecast. The 3,725 documents come from 1,484 sources and 12,416 authors. Only 222 authors wrote alone. The mean is 4.74 co-authors per document, and international co-authorship is 31.17 per cent. The file holds 11,142 author keywords. Of the documents, 2,709 are articles and 1,016 are reviews. The mean citation count is 21.43, and the total is 79,822. The reported growth rate of -6.44 per cent is an artefact of the window. It compares the first year with the last, and 2027 has 16 documents. Set 2014 against 2026 and the rise is about 33 per cent a year. The 2026 count will finish higher than 1,161, because the export is dated 11 September 2026. A linear trend line should not be used on this series. The practical reading is that the field is young, written in teams, and still filling in. The average document age is 2.23 years. A bibliometric reading is suited to a set of this size precisely because a narrative review cannot cover it (Donthu et al., 2021).

Citations are headed by one paper and otherwise spread. (Tao & Zhang, 2017) has 1,385 citations. Applied Sciences leads the sources with 75 documents, then Sustainability, IEEE Access, the International Journal of Advanced Manufacturing Technology, and Energies, with 62, 61, 52, and 50. Even the top journal holds about 2 per cent. A reader who follows one outlet, or the single most cited paper, will miss most of the set. That scatter is why a systematic selection was used (Linnenluecke et al., 2020; Paul et al., 2021).

Country counts are documents with at least one author from that country, so a two-country paper counts twice. China has 1,099 documents, India 532, and the United States 359. Saudi Arabia, Iran, the United Kingdom, South Korea, Spain, Italy, and Malaysia follow, with 213, 189, 174, 156, 134, 133, and 130. Six of the top ten are in Asia. Grey areas on the map, including Russia, Greenland, and parts of central Africa, mean little or no data in this file. The work is international, and a few large countries still produce most of it. The three-field plot joins the top 15 countries, the top 20 authors, and the top 15 keywords. China is the largest country box. Almost all of the top author labels are Chinese surnames with an initial: Wang Y (80 documents), Zhang Y (75), Wang X (57), Li Y (55), and Liu Y (54). Scopus stores authors as surname and initial, so these are name groups, not single researchers. Artificial intelligence is the largest keyword box, with 1,206 documents, then machine learning with 566 and optimization with 236. The file counts “artificial intelligence” and “artificial intelligence (ai)” apart, which splits one concept across two nodes.

The VOSviewer maps agree on the structure and disagree only on how finely it is cut (van Eck and Waltman, 2010). At 30 occurrences there are four large clusters and one small one. Artificial intelligence links to every cluster. One cluster covers factory and decision topics, including digital twin, industry 4.0, smart manufacturing, and scheduling. One covers energy and environment, including hydrogen, renewable energy, biomass, and sustainability. One holds optimisation methods, including genetic algorithms, particle swarm optimization, and neural networks. One holds life-science indexing terms, including metabolism, biosynthesis, and drug development. A small group covers crops. At 15 occurrences the same core splits, and small niches appear, including oil fields, wind turbines, and data privacy. A simpler network of about 45 keywords falls into three clusters: optimisation with energy, learning with smart factories, and study terms with life-science words. The maps are a picture of vocabulary, not of decision quality (Zupic and Čater, 2015). A large node means a word is used often. It does not mean the papers under that word solve an allocation, a schedule, or a capacity problem.

The review looks past those large nodes. In the 3,719-record corpus, additive manufacturing has 58 records, food safety 24, microalgae 41, and anaerobic digestion 63. Digital twin has 135, predictive maintenance 89, and reinforcement learning 107. Robust optimization has 9 and vehicle routing has 4. (Esteso et al., 2023) places that learning mainly in simplified scheduling environments, so the advantage over a tuned exact solver is not established. (Y. Zhang et al., 2022) and (Li et al., 2020) sit on the same scheduling line, as do (Usman et al., 2026) and (Prata et al., 2024). Cases that keep an optimisation model and use learning only to forecast cost or demand remain the exception (Boresta et al., 2024); (Vaz et al., 2024). Robust treatments are real but rare (Ajagekar et al., 2023; R. Zhang et al., 2020). (Danach et al., 2026) is one of the few records that carries a forecast into a schedule. (Wahid et al., 2022) and (Christou et al., 2022) stop earlier, at the failure forecast and the quality platform.

The bioprocess and small-circle records confirm the split. Two records out of 418 on fermentation, metabolism, microalgae, or bioprocesses mention a formal programming method or model predictive control. (Imamoglu, 2024) and (Hossain et al., 2022) model productivity. (Kabir et al., 2023) models hydrogen yield. (Murali et al., 2026) makes the plant-level gap explicit. (Soori et al.,

2025) and (Ciccone et al., 2023) keep additive manufacturing on quality, design, and materials. (Elbadawi et al., 2020) predicts printability and does not schedule the queue. (Serov & Vinogradov, 2022) still treats nanomedicine design as early. Food-chain studies detect contamination or forecast yield (Dakhia et al., 2025; Kollia et al., 2021; Pandey et al., 2023) and do not route the fleet. (Tsolakis et al., 2022) is the logistics exception, and it notes the missing environmental term in the decision model.

Four gaps follow, and they are the agenda. First, learning should be tested against an exact or heuristic benchmark, not only against another learning policy, and the test should use a realistic instance (Esteso et al., 2023). Scheduling is where that comparison is easiest to run. Bioprocess, additive manufacturing, and food systems are where it is still rare (Murali et al., 2026; Ciccone et al., 2023; Kollia et al., 2021), which is why a single well-specified study in one of those domains would move the field more than another scheduling variant on a toy shop. Second, uncertainty needs a formulation. Nine records on robust optimization, against 107 on reinforcement learning, is not a balance that matches plant data (Ajagekar et al., 2023). Third, explainability, human oversight, and privacy-preserving training should enter the decision model as constraints, not as a separate keyword (Danach et al., 2026; Nguyen et al., 2025; Tóth et al., 2023; Yang et al., 2022). Fourth, the objective should include the resource cost of the model. (Wheeler, 2026), drawing on 73 empirical studies, reports that environmental outcomes vary tenfold to sixtyfold across regions. A method that ignores that cost will rank actions differently in different places. Newer tools do not close these gaps by themselves. (Chen & Huang, 2025), (Božejko et al., 2026), and (Ajagekar & You, 2022) extend the method set. They do not yet supply the missing plant-level decision models.

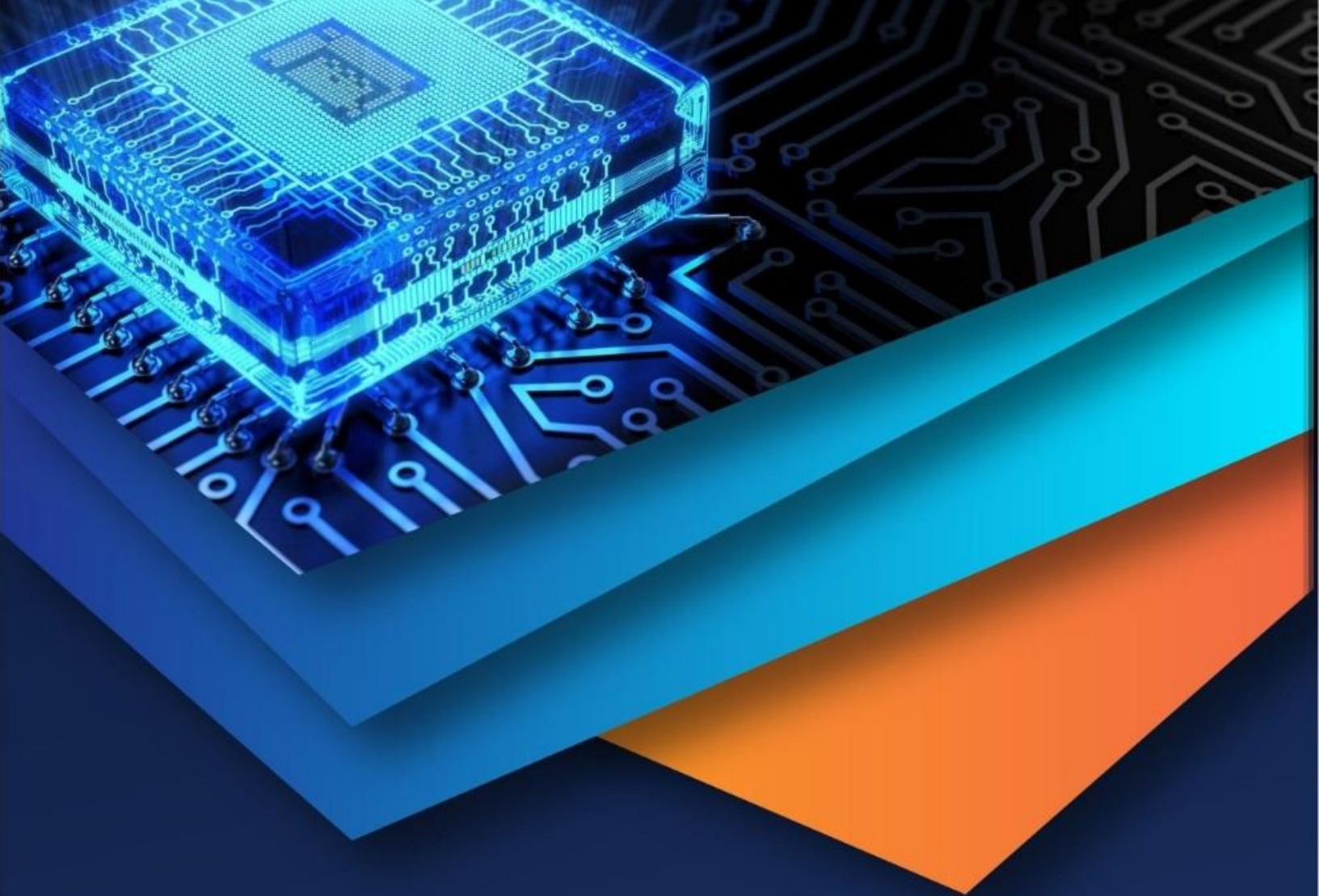
Several limits follow from the design, and they bound what the agenda can claim. The search used one database and one Boolean string (Donthu et al., 2021). The filters removed 879 documents on time, 3,298 on document type, 379 on language, and 28 on journal. Conference papers are outside the set. The export has no cited references, so co-citation could not be run, and the intellectual base of the field is not identified here (Zupic and Čater, 2015). Author counts for Wang Y and similar labels are name groups. Keyword variants were left split. The 2026 total is incomplete, and the 2027 count should not be read as decline. Country totals double-count internationally co-authored papers. The review corpus, the performance file, and the journal-filter total differ by a small margin: 3,719, 3,725, and 3,727. PRISMA records the selection path. It does not appraise the quality of each paper (Moher et al., 2010).

What the file supports is a description, not a ranking of methods. The literature is young, team-based, and Asia-heavy, spread across 1,484 sources, with more than half of its documents dated 2025 or 2026. The maps put artificial intelligence, machine learning, and optimization at the centre, and energy, smart manufacturing, and life sciences around them. The review shows that the small circles are where a formal decision model is still rare (Murali et al., 2026; Soori et al., 2025). The next useful paper is not another map of the same three words. It is a study that recommends an action in one of those circles, states the uncertainty, and tests the recommendation against a decision model.

REFERENCES

- [1] Ajagekar, A. and You, F. (2022) Quantum computing and quantum artificial intelligence for renewable and sustainable energy: a emerging prospect towards climate neutrality. *Renewable and Sustainable Energy Reviews*, 165. <https://doi.org/10.1016/j.rser.2022.112493>
- [2] Ajagekar, A., Mattson, N.S. and You, F. (2023) Energy-efficient AI-based control of semi-closed greenhouses leveraging robust optimization in deep reinforcement learning. *Advances in Applied Energy*, 9. <https://doi.org/10.1016/j.adapen.2022.100119>
- [3] Boresta, M., Pinto, D.M. and Stecca, G. (2024) Bridging operations research and machine learning for service cost prediction in logistics and service industries. *Annals of Operations Research*, 342(1). <https://doi.org/10.1007/s10479-024-05962-1>
- [4] Božejko, W., Trotskiy, S., Uchroński, M. and Wodecki, M. (2026) Optimizing two-machine scheduling in flexible manufacturing systems using autonomous AI and quantum computing. *Neurocomputing*, 664. <https://doi.org/10.1016/j.neucom.2025.132067>
- [5] Chen, D. and Huang, Y. (2025) Integrating reinforcement learning and large language models for crop production process management optimization and control through a new knowledge-based deep learning paradigm. *Computers and Electronics in Agriculture*, 232. <https://doi.org/10.1016/j.compag.2025.110028>
- [6] Chen, S.C., Chen, H.M., Chen, H.K. and Li, C.L. (2024) Multi-objective optimization in Industry 5.0: human-centric AI integration for sustainable and intelligent manufacturing. *Processes*, 12(12). <https://doi.org/10.3390/pr12122723>
- [7] Christou, I.T., Kefalakis, N., Soldatos, J.K. and Despotopoulou, A.M. (2022) End-to-end industrial IoT platform for Quality 4.0 applications. *Computers in Industry*, 137. <https://doi.org/10.1016/j.compind.2021.103591>
- [8] Ciccone, F., Bacciaglia, A. and Ceruti, A. (2023) Optimization with artificial intelligence in additive manufacturing: a systematic review. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 45(6). <https://doi.org/10.1007/s40430-023-04200-2>
- [9] Dakhia, Z., Russo, M. and Merenda, M. (2025) AI-enabled IoT for food computing: challenges, opportunities, and future directions. *Sensors*, 25(7). <https://doi.org/10.3390/s25072147>
- [10] Danach, K., Harb, H., Issa, H. and Saker, L. (2026) An explainable data-driven optimization framework for industrial predictive maintenance scheduling. *Results in Engineering*, 29. <https://doi.org/10.1016/j.rineng.2026.109022>
- [11] Elbadawi, M., Muñiz Castro, B., Gavins, F.K.H., Ong, J.J., Gaisford, S., Pérez, G. et al. (2020) M3DISEEN: a novel machine learning approach for predicting the 3D printability of medicines. *International Journal of Pharmaceutics*, 590. <https://doi.org/10.1016/j.ijpharm.2020.119837>

- [12] Estes, A., Peidro, D., Mula, J. and Díaz-Madroñero, M. (2023) Reinforcement learning applied to production planning and control. *International Journal of Production Research*, 61(16). <https://doi.org/10.1080/00207543.2022.2104180>
- [13] Hossain, S.M.Z., Sultana, N., Razzak, S.A. and Hossain, M.M. (2022) Modeling and multi-objective optimization of microalgae biomass production and CO₂ biofixation using hybrid intelligence approaches. *Renewable and Sustainable Energy Reviews*, 157. <https://doi.org/10.1016/j.rser.2021.112016>
- [14] Imamoglu, E. (2024) Artificial intelligence and/or machine learning algorithms in microalgae bioprocesses. *Bioengineering*, 11(11). <https://doi.org/10.3390/bioengineering11111143>
- [15] Kabir, M.M., Roy, S.K., Alam, F., Nam, S.Y., Im, K.S., Tijing, L. et al. (2023) Machine learning-based prediction and optimization of green hydrogen production technologies from water industries for a circular economy. *Desalination*, 567. <https://doi.org/10.1016/j.desal.2023.116992>
- [16] Kamran, M.A., Kia, R., Goodarzi, F. and Ghasemi, P. (2023) A new vaccine supply chain network under COVID-19 conditions considering system dynamic: artificial intelligence algorithms. *Socio-Economic Planning Sciences*, 85. <https://doi.org/10.1016/j.seps.2022.101378>
- [17] Kollia, I., Stevenson, J. and Kollias, S. (2021) AI-enabled efficient and safe food supply chain. *Electronics*, 10(11). <https://doi.org/10.3390/electronics10111223>
- [18] Li, Y., Carabelli, S., Fadda, E., Manerba, D., Tadei, R. and Terzo, O. (2020) Machine learning and optimization for production rescheduling in Industry 4.0. *International Journal of Advanced Manufacturing Technology*, 110(9–10). <https://doi.org/10.1007/s00170-020-05850-5>
- [19] Martini, B., Bellisario, D. and Coletti, P. (2024) Human-centered and sustainable artificial intelligence in Industry 5.0: challenges and perspectives. *Sustainability*, 16(13). <https://doi.org/10.3390/su16135448>
- [20] Murali, R., Bywater, A., Dolat, M., Dekhici, B., Zarei, M., Hilton, L. et al. (2026) Anaerobic digestion site-wide optimisation and decision-making: an industrial perspective and review. *Renewable and Sustainable Energy Reviews*, 226. <https://doi.org/10.1016/j.rser.2025.116402>
- [21] Ng, W.L., Goh, G.L., Goh, G.D., Ten, J.S.J. and Yeong, W.Y. (2024) Progress and opportunities for machine learning in materials and processes of additive manufacturing. *Advanced Materials*, 36(34). <https://doi.org/10.1002/adma.202310006>
- [22] Nguyen, Q.T., Truong, T.C., Nguyen, T.P., Tran, T.N., Mesicek, J. and Pagac, M. (2025) Explainable artificial intelligence in additive manufacturing: a systematic review on methods. [journal, volume and DOI missing]
- [23] Pandey, V.K., Srivastava, S., Dash, K.K., Singh, R., Mukarram, S.A., Kovács, B. et al. (2023) Machine learning algorithms and fundamentals as emerging safety tools in preservation of fruits and vegetables: a review. *Processes*, 11(6). <https://doi.org/10.3390/pr11061720>
- [24] Prata, B.A., Abreu, L.R. and Nagano, M.S. (2024) Applications of constraint programming in production scheduling problems: a descriptive bibliometric analysis. *Results in Control and Optimization*, 14. <https://doi.org/10.1016/j.rico.2023.100350>
- [25] Serov, N. and Vinogradov, V. (2022) Artificial intelligence to bring nanomedicine to life. *Advanced Drug Delivery Reviews*, 184. <https://doi.org/10.1016/j.addr.2022.114194>
- [26] Soori, M., Jough, F.K.G., Dastres, R. and Arezoo, B. (2025) Additive manufacturing modification by artificial intelligence, machine learning, and deep learning: a review. *Additive Manufacturing*. [volume and DOI missing]
- [27] Tao, F. and Zhang, M. (2017) Digital twin shop-floor: a new shop-floor paradigm towards smart manufacturing. *IEEE Access*, 5. <https://doi.org/10.1109/ACCESS.2017.2756061>
- [28] Tóth, A., Nagy, L., Kennedy, R., Bohuš, B., Abonyi, J. and Ruppert, T. (2023) The human-centric Industry 5.0 collaboration architecture. *MethodsX*, 11. <https://doi.org/10.1016/j.mex.2023.102260>
- [29] Tsolakis, N., Zissis, D., Papaefthimiou, S. and Korfiatis, N. (2022) Towards AI driven environmental sustainability: an application of automated logistics in container port terminals. *International Journal of Production Research*, 60(14). <https://doi.org/10.1080/00207543.2021.1914355>
- [30] Ukwatha, J., Herath, S. and Meddage, D.P.P. (2024) A review of machine learning (ML) and explainable artificial intelligence (XAI) methods in additive manufacturing (3D printing). *Materials Today Communications*, 41. <https://doi.org/10.1016/j.mtcomm.2024.110294>
- [31] Usman, S., Ye, T., Ahmed, F., Huang, S., Haider, M.H., Qin, W. et al. (2026) Job-shop scheduling with resource flexibility: a systematic review from traditional to AI-integrated approaches. *Journal of Industrial Information Integration*, 51. <https://doi.org/10.1016/j.jii.2026.101093>
- [32] Vaz, L.V., Gonçalves, M.C., Dias, I.C.P. and Nara, E.O.B. (2024) Application of a production planning model based on linear programming and machine learning techniques. *Journal of Engineering and Technology for Industrial Applications*, 10(45). <https://doi.org/10.5935/jetia.v10i45.920>
- [33] Wahid, A., Breslin, J.G. and Intizar, M.A. (2022) Prediction of machine failure in Industry 4.0: a hybrid CNN-LSTM framework. *Applied Sciences*, 12(9). <https://doi.org/10.3390/app12094221>
- [34] Wheeler, M.R., Everett, B. and Prybutok, V. (2026) Navigating the environmental paradox of AI: a decision framework for clean technology practitioners. *Clean Technologies*, 8(2). <https://doi.org/10.3390/cleantechnol8020051>
- [35] Yang, H., Yuan, J., Li, C., Zhao, G., Sun, Z., Yao, Q. et al. (2022) BrainIoT: brain-like productive services provisioning with federated learning in industrial IoT. *IEEE Internet of Things Journal*, 9(3). <https://doi.org/10.1109/JIOT.2021.3089334>
- [36] Zhang, C., Wu, Y., Ma, Y., Song, W., Le, Z., Cao, Z. et al. (2023) A review on learning to solve combinatorial optimisation problems in manufacturing. *IET Collaborative Intelligent Manufacturing*, 5(1). <https://doi.org/10.1049/cim2.12072>
- [37] Zhang, R., Song, S. and Wu, C. (2020) Robust scheduling of hot rolling production by local search enhanced ant colony optimization algorithm. *IEEE Transactions on Industrial Informatics*, 16(4). <https://doi.org/10.1109/TII.2019.2944247>
- [38] Zhang, Y., Zhu, H., Tang, D., Zhou, T. and Gui, Y. (2022) Dynamic job shop scheduling based on deep reinforcement learning for multi-agent manufacturing systems. *Robotics and Computer-Integrated Manufacturing*, 78. <https://doi.org/10.1016/j.rcim.2022.102412>



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