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Transforming Supply Chain Management with Aritifical Intellgience, Machine Learning, Deep Learning, Quantum Computing, and Cloud Computing: Innovation for Boosting Efficiency and Reinforcing Resiliecne in Australian Indsutry 5.0

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TRANSFORMING SUPPLY CHAIN MANAGEMENT WITH ARITIFICAL INTELLGIENCE, MACHINE LEARNING, DEEP LEARNING, QUANTUM COMPUTING, AND CLOUD COMPUTING: INNOVATION FOR BOOSTING EFFICIENCY AND REINFORCING RESILIECNE IN AUSTRALIAN INDSUTRY 5.0

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ABSTRACT

Industry 5.0 has been changing the human robotic collaboration levels with higher personalization, greener production, resilient systems, more advanced technology, better Artificial Technology, Machine Learning, Quantum Computers, Cloud computing, Deep Learning and Block Chain technologies. Smart Manufacturing enhances customization and flexibility variables that positively impact workforce with considerable ethical practices. Innovation plays a crucial role in revolutionizing the world of Supply Chain. Industry 5.0 adds value by enhancing efficiency, navigating challenges, and handling cybersecurity concerns. With data growth, development, and abundance, Supply Chain Management problems are requiring more intensive algorithms, technological adjustments, computational power, and innovational applications. Transitioning into the 5th generation of Industrialization brings interesting challenges and offerings in the efficiency building blocks of the Supply Chain Management. Industry applications welcome private, government, and NGO's. Transitional challenges like building trust, change management, and data management. With transformative and rapidly growing technology, ordinary problems solving is becoming intensively difficult. Strategizing suitable approaches will refine the wellbeing for a smoother transition into the next global industrial revolution. Scalability and wellbeing will be focused on through expansion of commercialization of accurate quantum level technologies that decrease error and improve accuracy relevancy. Competitive advantages will be explored through the wellbeing implications of highlighting the importance of applications. Building a reinforced and efficient 5th generation supply chain hones to practically apply skills that improve the wellbeing of the industries through stable fully capable supply chain management. With major industry transitions and implementations, Quantum computing and major growth strategy offers the business an upper hand in transforming businesses into more adept, intelligent, and successful metrics. Industry benefits range from mass customization collaborative robots, blockchain, security, and sustainability. Results range from sustainability, achieving KPI's, efficiency, to enhanced cybersecurity.

Keywords: Computing, Optimization, Supply Chain Management, Innovation

1. INTRODUCTION

Smart grid, intelligent systems, and more advanced automated technologies are improving the world through innovation, strength, unity, and waste reduction. Robots have higher accuracy factors, design tolerances, and reduce the need for human interaction. Historical limitations can be bypassed with a robust dataset and prominent algorithms. Challenges in the Industrial transition is through high installation costs for these state-of-the-art technologies. With energy, green manufacturing framework and modular scalable system framework, industry 5.0 has higher vulnerability points that need to be addressed. AI uses data encryption, access control, threat detection, harm prevention, and continuous monitoring sensitivity to ensure

there are smart sensors to collect and analyse the data from various sources. Further concerns regarding resource optimization, lifecycle assessment, equipment replacement, and scalability across the digital framework. Blockchain technologies can enhance the wellbeing of customisation and flexibility matters to positively impact workforce. Traditional Optimisation, Simulation, Enterprise Resource Planning Systems, and algorithms transform the industry into more updated cloud integrated platforms. Industry 5.0 takes high volumes of data that need audacious spacious storage, handling, processing, retrieving, and analysis. This computational power is essential for the wellbeing of AI. Businesses are slowly transitioning into Industry 5.0. Newer KPI's have to be implemented, adopted, and discussed to enhance the overall performance. New technology means new formulas. Evolution to cybersecurity increases the mechanics of integrating human concerns with machine. Incorporating AI, ML, and DL introduces the world to a whole new digital factor. Physical processes can now be more cleverly monitored, handled, and processed. Smarter sensors, IoT and enabling technology help push boundaries of what previous technologies have been expected to do. Privacy concerns are now more important and relevant to the community, raising more ethical concerns that are very important and worthy of discussion. Many laws may have to be changed for the development and usage of the Industry 5.0 technological workspace.

2. OBJECTIVES

Technology aims to digitalize processes or sustainability initiatives through data driven decision making with a human centric approach. Automation and robotics build excellent welfare to enhance collaboration with circular economy-based supply chains with agility and responsiveness. Smart supply chain networks are well designed for risk management and customer centricity with Blockchain transparency and systems integration. [1] helps build rapport in value adding digitalization of Industry 5.0. Objective inner value adding metrics are essential for the wellbeing of the systems holistic approach.

3. FUNDAMENTALS

The fundamentals of Industry 5.0 consist of offering Human Centric Designs that collaborate and facilitate flexibility with centralized data storage, scalability, cost efficiency. Building systems that enhance capability metrics for operations management or designs. Making data driven decision making in the areas of Sustainability, Customization, High Levels of Personalization, Collaborative Robots. Tools in Aritificial Intelligence, Machine Learning, Deep Learning, Quantum Computing, or Digital Twins facilitate the wellbeing of successful outputs for this technology. The building blocks for this successful platform require data sources, data integration across the system, AI, ML integration, Predictive Maintenance, demand forecasting, Risk Management, Optimization strategy, Inventory Management, Routing, Scheduling, Automation, Warehouse Operations, Supplier and Customer Management, Supplier Evaluation, and Customer Insights [2]. [1] expresses interest in artificial intelligent technology matters that help automate many tedious tasks with higher accuracy returns. AI forecasting accuracy models are more stable and more reliable. Applied AI and Simulated annealing Convoluted Neural Networking DL models can discuss market conditions, handle inventory management, predict stock levels to minimize holding costs and decrease risks [3]. Solution vector outputs can have higher accuracy that focus on Boltzmann distribution quantitative key factors with continuous Epochs to search for minimal time constraints and fewest iterations.

Supply Chain Management Optimization handles many KPI's modelling problems like bipartite assignment, resource distribution, bottleneck reduction, and more efficient in-depth root cause (i.e. 100 layers of root cause analysis for bottlenecks). Quality Assurance, Control and reliability can be enhanced and applied with more efficient methods like anomaly detection or dynamic supplier selection. Human machine collaboration can build systems that are extensively beneficial and convenient for employment and development factors for "Sustainability, environmental stewardship, social benefit, and human centricity with 6R methodology and logistics efficiency" [2], [3]. [4] emphasizes the intellectual capacity required to implement and appoint deep Learning algorithms that source from Medicine Quantum Computing. These Bayesian optimization algorithms are applicable to "intelligent Control and robotics" that are essentials for Quantum Bits, Superposition and Entanglement for complex optimization problems. Using rooted Bayesian intelligence algorithms helps apply quantum computational accuracy for Industry 5.0 with deep learning neural networks. [5], [6] reviews Quantum computing systems with bit qubit, tensor product, super positioning, quantum reversibility and Gates. According to [5], [6] Genetic and Quantum Algorithms can help solve Quantum Optimization problems for Industry 5.0 like inventory optimization, routing, scheduling, supply chain network design production planning, or forecasting. In addition, 50.35% publication in Physics and Astronomy, 34.56% in Computer Engineering and 26.61% Engineering of research output gears toward quantum advancements. Furthermore, applied physics, engineering, and computer engineering help build value by creating and using more responsive models. [7] argues that stochastic algorithms "can offer exponential performance improvement over NP-Complete problems" which can't run through alternative approaches. Using Bayesian optimization methods with hyperparameters for efficient quantum programming synthetic approaches, iteration cycles decrease, and cost factors decreasingly stabilize. Successful implementation of Industry 5.0 requires minimal risks of hesitancy. [8] successfully performs a Political, Economics, Social and Technology analysis of how Industry 5.0 can perform and use its fundamentals professionally. In other words, stakeholders must be ready to discuss "Preference collection, weighting, classification, consensus reaching, and opinion aggregation".

4. IMPACT

Disruptions have been increasing due to Political, Economic, Social, Technological (PEST) challenges across global societies. From COVID 19 to inflation and competency discussions, Industry 5.0 in Supply Chain Management has been heavily influenced through social changes [9]. [8] highlights the investors and stakeholder perception regarding illumination of growth, rate of return under limited barriers and resourcefulness. Heterogenous systems can assess advanced state of the art integration platforms through informational transparency partitioning that "enhance efficiency". Having openly integrated transparent systems can open the doors to highly functional Industry 5.0 matters. Hence, impactful metrics are observable when shaping the future of industrial landscape smart technology based oppositional findings [10]. [2] points to data growth and impacts in real world applications that enhance accurate findings to supply customer needs. Clever technologies are cleverly meeting needs through industry 5.0 technological based future manufacturing capabilities. [11] - [13] assert the wellbeing of cybersecurity impacts, cryptography, threat detection, and response time to validate circular economical flow that positively and coherently open doors for future opportunities. Amazon, Alibaba and IBM increase the number of consensus protocols that invest and apply blockchain technologies to increase transparency levels, of consensus

protocols which improve efficiency in E-commerce. Through blockchain risk mitigation strategies, increased operational efficiency, waste reduction, cost minimization, enhanced operations, and industrial processes have been reported in the industry 5.0 to grow and add value. Though collecting preferences, clustering and aggregating matter, positive impacts can be professionally recorded [8]. [10], [14] build strong based multi layered architecture that help address resilience, adaptation, sustainability and promote talents, diversity and empowerment for economic stability. BCG identified that "9 key enabling technologies" were "enabling and more targeted for energy efficiency, storage, and renewable energy". Results are verified and validated in the work of Sachsenmeier since 2010 to cite notable intelligent words that clarified concepts of bulk of collections to important findings that discuss synonymous works of human robotic work collaboration. [15], [16] introduce quantum computational intelligent effects on robotic arms that solve equations to optimize movement strategies, thereby enhancing movement, efficiency, and turbulence in the robotic industry. Deployment and detection strategies are designed for intrusion-based optimality to resiliently and robustly respond to achieve higher industrial applications with security benefits. [17] suggests unique multi objective job rotational models for industry 5.0 to positively enhance competitive advantages in the market through machine and human based collaboration to advance. Positive impact strategies can be studied and enhanced in the wellbeing of case managerial insights that build transformative Supply Chain Management efficiency.

5. ENHANCEMENTS

[12] - [13] perform Industry 5.0 enhancement techniques through "extensive algorithms, classical simulations, theoretical intelligence, hardware improvements that Richard Feynman discussed in 1980's. Pushing Quantum Supremacy using Shor's Algorithm for factoring and handling quantum bits achieves numerous advances in computational power levels. Through robust, resilient, and sustainable Industry 5.0, [13] highlights that "layers of collective manmade intelligence with robotics integrate into a powerful combination that enhances strategic advantages in the enhancements in the workplace environment". [18] inherently opens the step-by-step discussion from Industry 1.0 to Industry 6.0.Chronicling the enhancement highlights the mass differences and long distances that the technological revolutions have progressed. Digital Technologies will enhance AI, ML, DL, and Quantum Computing applications that improve robustness, and cognitive functioning. Cloud computing enhances industrial context to improve the wellbeing for approaches and perspectives through intelligent automation, devices, materials, and algorithmic discussions for 5th generation printing, visualization, and technological advancements. [15] models the tools, equations, and material in a coordination approach that measures cutting pathways mathematically for the wellbeing of kaizen-based merits.[17] discusses enhancements though applied theories of optimization that have multi layered, finitely dimensioned managerial insights that attribute collaborative data integration and wellbeing in the industry 5.0. [19] – [21] report quality and precision improvements through Aritificial Neural Network and efficient company generation of artificial data control. Industry 5.0 can simulate and organise industrial processes to make data driven intelligent system. Building a powerful duo-based system with machine and man intervention through intelligent rich sources to support management with generative AI facilitation. Creating novel interactions through multi-layer phase testing sentiments and frequency time management is more efficient through optimization, improvisation and management. Problems in context adhere to optimization multi-layer dynamic lot sizing with multiple transportation modes and more linearly feasible flexibility for wellbeing metrics.

[21], [22] discusses Delphi methods to the industry 5.0 to enhance and apply feasible metrics for logistical support management with genetic programming to enhance internal facilitation solution applicable methods to heuristic benchmark framework. Furthermore, outputs are needed for further research into improvements to "reduce computational time and enhance efficiency with dynamic and stochastic aspects like machine crashes or breakdowns against and enhanced sensorial data management processing" [22].

6. IBM CASE STUDY

IBM Watson collaborates between human and machine capabilities to use cutting edge technologies in AI, ML, DL, Cloud, or Quantum computing for supply chain management applications. Many business face challenges in handling uncertainty, disruptions, and sustainability concerns. With IBM software to enhance organizations with better, smarter, and more capable platform concerns, Engineers work well to enhance predictive forecasting capabilities in the market. IBM applications for high level analytical Autoregressive Moving Average models with exogenous inputs accurately forecast metrics that are required to handle inventory optimisation and respond to urgent real time demand shifts. With IBM Cloud Pak and Watson Supply Chain, Engineers can automate some decision-making concerns in logistics or transportation. Smarter warehousing is now feasible with robotics that automate the picking, packing, storing, and delivering processes. These systems are self-correcting, mitigate risk, and simulate possible scenarios that are important in handling resilience management. With quantum computing research expansion in IBM, Supply Chain Optimization is now more important in networks to reduce operational costs and enhance sustainability in the most eco-friendly and cost-effective solutions. Securing and encrypting this platform helps build rapport for IBM to sell and test different strategies in the most resilient and efficient solutions in the Industry 5.0 ecosystem [23].

7. BUILDING RESILIENCE

Resilience in Supply Chain Management builds on the fundamentals of adaptability, robustness, human machine collaboration factors, data security metrics, industry collaboration, cross functional teams, feedback loops, applied research, and development. [13] builds constructive adaption that is "smarter, flexible, autonomous, unmanned, sensor based … with adaptive capabilities … that promote smart operators as enablers of human centricity that are highly flexible to demonstrate capabilities". A successful transition to Industry 5.0 with a hybrid is necessary for adaptive responses [13]. [24], [14] build robust, agile, and more efficient business models that are consistently important activities that help firms deal with increasing complexities in the markets to adopt solutions with human automation symbiosis that navigate into improved knowledge and capabilities of operators. Designing systems that are more robustly profound enables failure recovery mechanisms. [25] discusses the genetic programming learning approaches that will increase machine dependency through creating interesting capable interfaces and ensuring that are important with higher result generation factors like parameters that influence ergonomic risks score values with higher rate of returns that replace human factors with machine contextual comprehension design metrics [6]. Global security concerns are important for cybersecurity, because every tech server has a risk factor for cyber concerns. Cyber-attacks can come from anywhere at any given time or place, thereby disrupting the Industry 5.0 progress, data, operational functioning, and possible stealing or sabotaging everything [24], [18]. In other words, having higher security construction in the industry 5.0 era is essential for excellent

cryptography and symmetry for communication frameworks through newer generational algorithms, platforms, centralized solutions for the essential optimal functional capabilities in the computational field. While quantum threats are highly impactful, many Engineers succeed and in fact preserve the technology in the digital work through trusted couriers that distribute digital communication [28]. Collaborative efforts can be maximized through robotics, IoT, cloud manufacturing, no human control platforms like Blackbox.ai. Building robust, efficient informational sharing across departments and supply chain management components [18]. Cross functional teams equipped with better technical skills that are required for operations, management, research etiquette that code data and ensure prosperous perceptions in technology, operations management, process design, and communicative sharing properties [28]. [22] mentions a genetic programming baseline approach that consists of feedback loop mechanisms for continuous improvements through iterations, novelties, innovation, technologies for applied research and develop investment to explore newer approaches and technologies that align with Industry 5.0 scope of system resilience.

8. CHALLENGES

Industry 5.0 faces many hurdles in data security, data integration, evolving dynamics, new skillsets, ethical and legal barriers. Data security has become increasingly more targeted by bandits and cyber criminals. Having a firmly structured datasets, servers, and firewalls helps build safely integrated environment for secure human machine interface interaction platforms. Authentication, access control, IoT security, and data integrity help resolve challenges in the workplace environment for industry 5.0. Building regulatory compliance, business continuity, third party risk management with AI and ML immediately detects incidents and raises responses with a few ethical considerations. Implementing robust security measures to educate and train the professional workforce in structured security frameworks that are comprehensive for installation, design, and usage helps build transparent industry 5.0. [8] discusses potential obstacles in legislative laws, installation costs, social impact, and robotic influence. With technological barriers, data immutability, aggregation, handleability, and permission. Industry 5.0 faces many challenges that can be addressed, discussed, and potentially solved for the benefits for of Industrial Engineering. Despite challenges, [5] emphasizes that “160 associations contributed 74.8% stake with an average of 91.07 publications per association “in Quantum Computing success.

9. VALIDATION

[27] Validates Industry 5.0 proof of concept, projects and testing requires intensive propositions to ensure that the rate of return is highly rewarding. With vulnerability assessments, penetration testing, and various security checks to ensure performance is reliable. With efficiency metrics, scalability testing, and usability concerns is crucial. Validating the technology required economics concerns such as risk factors, cost benefit analytics, rate of return on investment, and market supply and demand. Social transitions have to be studied and validated to ensure that social factors accept, adopt, and adapt to the successful transition. [27] discusses the technological productivity through having robots perform repetitive and dangerous jobs while people focus on creativity and efficient business solutions with reported increased business efficiency in various areas. [7] indicates that Quantum Bayesian optimization in Industry 5.0 have increased output delivery and in parametric and decreased costs. Quantum programming minimizes the burden on the

programs through stochastic models that autotune Bayesian optimization with stochastic synthesizers to solve NP problem with higher ease. [28] discusses a budget of "$679 billion and projected to exceed $1 trillion in 2027" for Global Cloud Computing Success and "more than 50% of enterprises will use industry cloud platforms by 2028". [29] expresses how Australia has a budget of $229 Million for Quantum computing exploration for applications in many industries. [30] showcases how Unilever uses AI to successfully implement innovation, analyse data structures and offer thousands of varieties for customers all over the world.

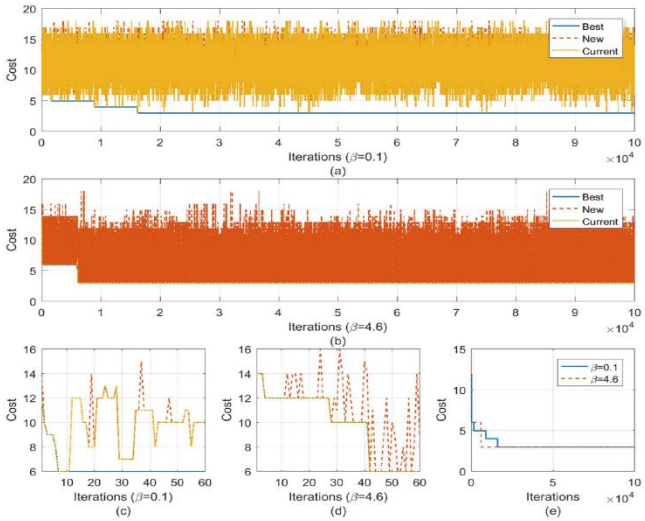

Figure 1: Validation Metrics for Quantum Computing [7]

Table 1: Fusion based validation methods [29]

Validation Method	Accuracy (%)	Miss Rate (%)
Fine Gaussian Support Vector Machines	90.4	9.6
Cubic Support Vector Machines	90.8	9.2
Fine k- Nearest Neighbours	92.0	8.0
Weighted k-Nearest Neighbours	93.1	6.9

10. CONCLUSION

Researches in Industry 5.0 transitions add value and enhance the world. Research indicates that there are many benchmarks that can help find paradigms that will incorporate human centric and sustainable growth. From digitalization, automation, platform integration, smart manufacturing, and IoT, Engineers are working cooperatively and continuously to make sure the transition is well adjusted and securely handled. From human factors to advanced robotics or generative AI, engineers should expect to build resilience and sustainable efficient systems particularly in supply chain management service or manufacturing sector. Expansion of data, increasing problem complexity and quantum computing is essential for data driven decision making historical data into structured accurate quantitative and qualitative models. Partial Autonomous Supply Chains are now possible through AI and ML driving factors to solve complex models with encryption, environmental impacts, decision making aids. Until the 6th generation

of industrialization comes out, the transition is very likely to become a successful entrepreneurial work of art.

REFERENCES

[1] A. Eldahshan, "Leveraging 21st Century Machine Learning Computational Power: Innovative Solutions by Industrial Engineers for Addressing Complex Australian Challenges and Enhancing Value Creation in Supply Chain Management," in Proc. 3rd Australian International Conference Industrial Engineering Operations Management, Sydney, Australia, Sep. 24-26, 2024.
[2] A. Akundi, D. Euresti, S. Luna, W. Ankobiah, A. Lopes, and I. Edinbarough, "State of Industry 5.0—Analysis and Identification of Current Research Trends," Applied Systems Innovation, vol. 5, no. 27, 2022, doi: 10.3390/asi5010027.
[3] L. M. Rasdi Rere, M. I. Fanany, and A. M. Arymurthy, "Simulated Annealing Algorithm for Deep Learning," Procedia Computer Science, vol. 72, pp. 137-144, 2015, doi: 10.1016/j.procs.2015.12.114.
[4] F. Valdez and P. Melin, "A review on quantum computing and deep learning algorithms and their applications," *Soft Computing*, vol. 26, no. 1, pp. 1-20, Jan. 2023. [Online]. Available: https://link.springer.com/article/10.1007/s00500-022-07037-4. [Accessed: Sep. 14, 2024].
[5] H. A. Bhat, F. A. Khanday, B. K. Kaushik, F. Bashir, and K. A. Shah, "Quantum Computing: Fundamentals, Implementations and Applications," IEEE Open Journal of Nanotechnology, vol. 6, pp. 58-78, May 2022, doi: 10.1109/OJNANO.2022.3178545.
[6] J. R. Koza, "Human-competitive results produced by genetic programming," Genetic Programming and Evolvable Machines., vol. 11, no. 3, pp. 251-284, May 2010, doi: 10.1007/s10710-010-9112-3.
[7] Y. Xiao, S. Nazarian, and P. Bogdan, "A stochastic quantum program synthesis framework based on Bayesian optimization," Scientific Reports, vol. 11, no. 13138, 2021, doi: 10.1038/s41598-021-91035-3.
[8] Z. J. Wang, Z. S. Chen, L. Xiao, Q. Su, K. Govindan, and M. J. Skibniewski, "Blockchain adoption in sustainable supply chains for Industry 5.0: A multistakeholder perspective," Journal of Innovation & Knowledge, vol. 8, p. 100425, Aug. 2023. [Online]. Available: https://doi.org/10.1016/j.jik.2023.100425
[9] A. Verma, P. Bhattacharya, N. Madhani, C. Trivedi, B. Bhushan, S. Tanwar, G. Sharma, P. N. Bokoro, and R. Sharma, "Blockchain for Industry 5.0: Vision, Opportunities, Key Enablers, and Future Directions," *IEEE Access*, vol. 12, pp. 12345-12358, 2024. [Online]. Available: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9809962. [Accessed: Sep. 14, 2024].
[10] X. Xu, Y. Lu, B. Vogel-Heuser, and L. Wang, "Industry 4.0 and Industry 5.0—Inception, conception and perception," Journal of Manufacturing Systems, vol. 61, pp. 530-535, Oct. 2021. Available online: https://doi.org/10.1016/j.jmsy.2021.10.005.
[11] S. E. Yunakovsky, M. Kot, N. Pozhar, D. Nabokov, M. Kudinov, A. Guglya, E. O. Kiktenko, E. Kolycheva, A. Borisov, and A. K. Fedorov, "Towards security recommendations for public key infrastructures for production environments in the post-quantum era," EPJ Quantum Technology, vol. 8, no. 14, 2021, doi: 10.1140/epjqt/s40507-021-00104-z.
[12] F. Arute et al., "Quantum supremacy using a programmable superconducting processor," Nature, vol. 574, pp. 505-510, Oct. 2019, doi: 10.1038/s41586-019-1666-5.
[13] M. Golovianko, V. Terziyan, V. Branytskyi, and D. Malyk, "Industry 4.0 vs. Industry 5.0: Co-existence, Transition, or a Hybrid," Procedia Computer Science, vol. 217, pp. 102-113, 2023, doi: 10.1016/j.procs.2022.12.206.

[14] P. Coelho, C. Bessa, J. Landeck, and C. Silva, "Industry 5.0: The Arising of a Concept," Procedia Computer Science, vol. 217, pp. 1137-1144, 2023, doi: 10.1016/j.procs.2022.12.312.
[15] N. Zioui, Y. Mahmoudi, A. Mahmoudi, M. Tadjine, and S. Bentouba, "A New Quantum-computing-based Algorithm for Robotic Arms and Rigid Bodies' Orientation," J Journal of Applied and Computational Mechanics, vol. 7, no. 3, pp. 1836-1846, Jul. 2021, doi: 10.22055/JACM.2021.37611.3048.
[16] M. Schmitt, "Securing the digital world: Protecting smart infrastructures and digital industries with artificial intelligence (AI)-enabled malware and intrusion detection," Journal of Industrial Information Integration, vol. 36, 100520, Sep. 2023. Available: https://doi.org/10.1016/j.jii.2023.100520.
[17] D. Battini, N. Berti, S. Finco, I. Zennaro, and A. Das, "Towards Industry 5.0: A multi-objective job rotation model for an inclusive workforce," International Journal Production Economics, vol. 250, 108619, Sep. 2022. Available: https://doi.org/10.1016/j.ijpe.2022.108619.
[18] N. Pilevari and F. Yavari, "Industry Revolutions Development from Industry 1.0 to Industry 5.0 in Manufacturing," Journal of Industrial Strategic Management, vol. 5, no. 2, pp. 44-63, 2020.
[19] I. Koliousis, A. Al-Surmi, and M. Bashiri, "Artificial intelligence and policy making; can small municipalities enable digital transformation?" International Journal Production Economics, vol. 274, 109324, Jun. 2024. Available: https://doi.org/10.1016/j.ijpe.2024.109324.
[20] K. Tamssaouet, E. Engebrethsen, and S. Dauzère-Pérès, "multi-item dynamic lot sizing with multiple transportation modes and item fragmentation," International Journal Production Economics, vol. 265, 109001, Aug. 2023. Available: https://doi.org/10.1016/j.ijpe.2023.109001.
[21] H. A. von der Gracht and I.-L. Darkow, "Scenarios for the logistics services industry: A Delphi-based analysis for 2025," International Journal Production Economics, vol. 127, pp. 46-59, May 2010. Available: https://doi.org/10.1016/j.ijpe.2010.04.013.
[22] R. Braune, F. Benda, K. F. Doerner, and R. F. Hartl, "A genetic programming learning approach to generate dispatching rules for flexible shop scheduling problems," International Journal of Production Economics, vol. 243, p. 108342, Oct. 2022. Available: https://doi.org/10.1016/j.ijpe.2021.108342.
[23] "Quantum Algorithms and Applications Study," New South Wales Chief Scientist & Engineer, 2022. [Online]. Available: https://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0009/612549/Quantum-Algorithms-and-Applications-Study-FINAL.pdf. [Accessed: 28-Sep-2024].
[24] J. Guo, L. Cui, S. L. Sun, and B. Zou, "How to innovate continuously? Conceptualizing generative capability," Journal of Innovation & Knowledge, vol. 7, p. 100177, 2022, doi: 10.1016/j.jik.2022.100177.
[25] Gartner, "Gartner Says Cloud Will Become a Business Necessity by 2028," Nov. 29, 2023. [Online]. Available: https://www.gartner.com/en/newsroom/press-releases/2023-11-29-gartner-says-cloud-will-become-a-business-necessity-by-2028. [Accessed: Sep. 28, 2024].
[26] "How AI and Digital Help Us Innovate Faster and Smarter," Unilever, 2023. [Online]. Available: https://www.unilever.com/news/news-search/2023/how-ai-and-digital-help-us-innovate-faster-and-smarter/. [Accessed: 28-Sep-2024].
[27] N. Ali, T. M. Ghazal, A. Ahmed, S. Abbas, M. A. Khan, H. M. Alzoubi, U. Farooq, M. Ahmad, and M. A. Khan, "Fusion-Based Supply Chain Collaboration Using Machine Learning Techniques,"

Intelligent Automation & Soft Computing, vol. 31, no. 3, pp. 1671-1690, 2022. DOI: 10.32604/iasc.2022.019892.
[28] M. Wu, Y. Ran, and S. X. Zhu, "Optimal pricing strategy: How to sell to strategic consumers?" International Journal Production Economics, vol. 244, p. 108367, Nov. 2022. Available: https://doi.org/10.1016/j.ijpe.2021.108367.
[29] D. Battini, N. Berti, S. Finco, I. Zennaro, and A. Das, "Towards industry 5.0: A multi-objective job rotation model for an inclusive workforce," International Journal of Production Economics, vol. 250, p. 108619, Sep. 2022. Available: https://doi.org/10.1016/j.ijpe.2022.108619.
[30] M. H. Zafar, E. F. Langas, and F. Sanfilippo, "Exploring the synergies between collaborative robotics, digital twins, augmentation, and industry 5.0 for smart manufacturing: A state-of-the-art review," Robotics and Computer–Integrated Manufacturing, vol. 89, p. 102769, Apr. 2024. Available: https://doi.org/10.1016/j.rcim.2024.102769.
[31] S. Qahtan, H. A. Alsattar, A. A. Zaidan, D. Pamucar, and M. Deveci, "Integrated sustainable transportation modelling approaches for electronic passenger vehicle in the context of industry 5.0," Journal of Innovation & Knowledge, vol. 7, p. 100277, 2022, doi: 10.1016/j.jik.2022.100277.