International Journal of Computer Applications Technology and Research
Volume 13–Issue 08, 73 – 89, 2024, ISSN:-2319–8656
DOI:10.7753/IJCATR1308.1008

Revolutionizing IT Infrastructure: The Impact of AI and Deep Learning on Business Digital Transformation

[a] Oladipo Olowe, Department of Computing, Sheffield Hallam University, Sheffield, United Kingdom; [b] Happy Omoze Iguare , Department of Computer Science, Morgan State University , [c] Nana Osei Safo, College of Liberal Arts and Sciences, Emporia State University, Emporia, Kansas
[d] Thomas Andrew Walugembe, Maharishi International University, Fairfield Iowa

Corresponding Author Contact: Oladipo Olowe, Department of Computing, Sheffield Hallam University, Sheffield, United Kingdom.

Abstract

The incorporation of artificial intelligence (AI) and deep learning (DL) into IT infrastructure is revolutionizing corporate operations and competitiveness in this present-day dynamic digital economy. These developments are crucial to the digital transformation of businesses since they provide relevant capabilities in data processing, automation, and decision-making. This study examines the impact of AI and DL on IT infrastructure, emphasizing how these technologies can foster business digital transformation. The findings of this review indicate that by streamlining workflows, eliminating errors, and automating repetitive tasks, AI and DL increase productivity and drive innovation. Through predictive analytics and modified services, these technologies also enhance the consumer experience. Furthermore, through real-time insights and predictive analytics, the integration of AI and DL into IT infrastructure improves decision-making capabilities. However, some associated challenges include concerns about data security and privacy. In conclusion, the incorporation of AI and DL into IT infrastructure is a crucial factor in the digital transformation of businesses, enabling opportunities for innovation and growth.

Keywords: Technology, Digital Transformation, Artificial Intelligence, Deep Learning,

1. Introduction

Digital transformation is completely changing how businesses operate, engage with their clients, and encourage expansion. It entails utilizing digital technologies to transform customer experiences, business operations, and processes. More adaptable, scalable, and intelligent IT solutions are gradually replacing or augmenting traditional IT systems, which are frequently inflexible and compartmentalized. Businesses require this shift to stay competitive since it enables them the ability to use data-driven insights, increase operational effectiveness, and improve consumer experiences (Saarikko et al., 2020; Veldhoven & Vanthienen, 2021).

Artificial intelligence (AI) has gained a lot of attention in the business world recently, and it has the potential to completely change how companies operate, from supply chain

management and finance to customer service and marketing. As data becomes more readily available, machine learning and natural language processing techniques improve, and AI remains a vital tool for companies trying to remain competitive in the digital age. A recent survey by Gartner predicted that by 2022, 70% of businesses would be experimenting with AI in various ways and that by 2025, AI will have recovered 6.2 billion hours of worker productivity and generated $2.9 trillion in business value. These statistics show the enormous potential of AI in transforming business operations and opening up new avenues for growth and innovation. The impact of AI on business operations has been substantial, and it is only expected to grow in the years to come.

AI which can mimic human intelligence, and Deep Learning (DL), a branch of AI that focuses on multilayered neural networks, are at the forefront of digital transformation. AI and DL have the potential to improve cybersecurity, detect system faults, optimize resources, and automate difficult tasks for a transformed IT infrastructure. Specifically, DL and AI have a significant impact on the digital transformation of businesses. Businesses can increase productivity and innovation by incorporating these technologies into their IT infrastructure. AI-driven analytics give businesses a more comprehensive understanding of consumer behaviour and market trends (Haleem et al., 2022; Iyanuoluwa et al., 2024).

While AI and DL have numerous benefits, there may be drawbacks for businesses when implementing these technologies. These include the necessity of making large investments in new technology, the need for qualified personnel to oversee and run the digital systems, and concerns about the security and privacy of data (Trunk et al., 2020). However, these difficulties are greatly outweighed by the potential benefits, which is why AI and deep learning are crucial elements of every progressive digital transformation strategy. Owing to this, it is important to explore how AI and DL technologies combine to transform IT infrastructure and drive major changes in the digital transformation of businesses.

2. Trends in Digital Transformation

Although the digital revolution has been underway for some time, there is still disagreement over how digitization affects businesses and societies overall. In view of this, the analysis and organization can be grouped into two main categories, with the most important digital technologies, including big data, cloud computing, digital platforms, AI, and the Internet of Things (McAfee & Brynjolfsson, 2012; Tapscott, 2015).

Business models, customer experiences, and entire industries are changing as a result of digital transformation. Several significant trends in the field of digital transformation are emerging as businesses use digital technologies to improve consumer relations, streamline processes, and promote innovation. Specifically, businesses use these technologies to deliver improved goods and services while maintaining financial stability by utilizing the right tools (Kraus et al., 2021). This procedure almost always involves a number of organizational adjustments, such as form process optimization, with the goal of increasing revenue and reducing expenses. Three main trends which include the incorporation of digital technology, the move towards customer-centricity, and the growth of remote work and digital collaboration are examined by Mihardjo et al. (2019) and Vaska et al. (2021).

Cloud computing offers scalability, flexibility, and cost-effectiveness by allowing enterprises to store, manage, and process data via the Internet. According to Odunaiya et al. (2024), big data analytics is the process of analyzing massive and complicated data sets using advanced analytics techniques to find important trends and insights. The application of AI and ML technologies to decision-making, process automation, and customer experience enhancement is growing. The Internet of Things (IoT) is a network of linked sensors and devices that gather and share data, allowing businesses to remotely monitor and manage physical items (Kiran, 2019).

In addition, businesses are personalizing client experiences by offering specialized goods, services, and marketing campaigns through the use of data analytics and artificial intelligence. Organizations can better engage with customers by identifying touchpoints and opportunities by mapping the customer journey. In order to create smooth and consistent consumer

experiences across all touchpoints, omnichannel strategies connect online and offline channels (Haleem et al., 2022). Digital collaboration platforms enable teams to work together on projects, share documents, and communicate promptly regardless of their physical location. Organizations are using digital technology to engage with audiences and provide compelling online experiences in light of the growing popularity of virtual events and conferences (Dwivedi et al., 2021).

3. Revolutionizing IT Infrastructure

AI and DL technologies automate repetitive operations, optimize resource allocation, and facilitate decision-making, transforming IT infrastructure. The increase in operational efficiency is one of the biggest effects of incorporating AI and deep learning into IT infrastructure. Repetitive and complicated tasks can be automated thus liberating up human resources for more strategic and creative activities. Research has shown that AI-driven IT service management systems, for instance, can manage standard service requests such as system diagnostics and password resets (Heinonen et al., 2020).

Businesses can gain deeper insights and more precise forecasts with the use of AI as well as DL which greatly improve data analytics capabilities. DL algorithms can identify intricate patterns in massive datasets, which allows them to find important information that conventional analytical techniques would omit. In the finance industry, for example, AI systems examine consumer and market data to forecast stock prices and client behaviour more precisely (Haleem et al., 2022).

Cybersecurity is becoming a critical concern for businesses as they rely more and more on digital technologies. However, AI and DL provide sophisticated solutions for detecting and mitigating cyber threats. While traditional security systems often rely on predefined rules and signatures to identify threats, which can be circumvented by malware, AI-driven security systems continuously learn and adapt to new threats. For instance, DL models can analyze network traffic instantaneously to detect unusual patterns indicative of cyber-attacks. By analyzing customer data, AI systems can deliver personalized recommendations, modify marketing messages, and improve customer service (Dunsin et al., 2024; Ahmed et al.,

2022). Furthermore, e-commerce platforms like Amazon use AI algorithms to analyze browsing and purchase history to suggest products that customers are likely to purchase. This level of service increases customer satisfaction and loyalty (Kumar et al., 2024). Likewise, AI and DL also play a pivotal role in personalizing customer experiences, which is a key driver of business success in the digital age.

3.1 AI-Driven IT Infrastructure

The application of AI in infrastructure development is becoming increasingly essential as it transforms conventional methods and improves resilience, sustainability, and efficiency. AI plays a wide range of roles in the development of infrastructure, from planning and design to building and operation (McMillan & Varga, 2022). Large-scale data analysis from a variety of sources, such as satellite imaging, geographic information systems (GIS), socioeconomic data, and environmental data, depends heavily on AI (Demertzis et al., 2020). AI could derive insightful information from these datasets to guide infrastructure planning decision-making processes through the application of machine learning algorithms. For example, AI algorithms are able to forecast traffic patterns, evaluate the effects on the environment, and determine the best places for infrastructure projects based on variables like environmental sensitivity, economic activity, and population density (Jha et al., 2021; Son et al., 2023).

Engineers and architects may optimize infrastructure project design for sustainability, economy, and performance with the use of AI-powered technologies. Algorithms for generative design investigate a wide range of design possibilities and pinpoint solutions that maximize resilience and usefulness while reducing energy, material, and lifecycle costs (Oluleye et al., 2022; Almaz et al., 2024). AI may therefore aid with collaborative design processes by automating tedious chores and giving designers real-time feedback so they can improve and iterate on their designs more quickly. Through historical data analysis, possible hazard identification, and risk prediction, AI technologies improve risk assessment and mitigation tactics in infrastructure development. AI algorithms can evaluate the structural integrity of infrastructure assets, identify anomalies, and anticipate maintenance needs to avoid expensive

breakdowns and interruptions by combining current data from sensors and IoT devices (Yazdi et al., 2024).

AI-driven project management solutions automate repetitive operations, optimize resource allocation, and offer immediate monitoring and reporting capabilities, all of which increase the efficiency and transparency of infrastructure development projects (Shamim, 2024). AI-powered analytics can be used by project managers to monitor work, spot obstacles, and reduce delays, all of which help to guarantee that projects are completed on schedule and within budget. During the construction phase of infrastructure projects, productivity, safety, and quality control are improved by robotics and automation technologies enabled by AI (Korke et al., 2023). Drones, robotic systems, and autonomous construction vehicles can carry out operations like material handling, structural assembly, and site surveying more precisely and effectively than conventional techniques, which lowers labour costs and minimizes building errors.

Through the implementation of smart infrastructure systems furnished with sensors, IoT devices, and predictive analytics capabilities, AI streamlines the management and upkeep of infrastructure assets (Serrano, 2020; Alahi et al., 2023). These systems enable proactive maintenance methods that maximize asset longevity, minimize downtime, and save lifecycle costs by monitoring asset performance instantaneously, detecting abnormalities, and predicting maintenance requirements. AI plays a revolutionary role in infrastructure development, providing new opportunities to enhance resilience, efficiency, and sustainability across the infrastructure lifecycle. Infrastructure stakeholders may improve project results, optimize designs, reduce risks, and make informed decisions by utilizing AI technology (Prifti, 2022). This will ultimately result in the creation of more resilient and sustainable built environments for future generations.

3.2 Role of Deep Learning in Advancing IT Systems

DL a type of AI that simulates the neural networks of the human brain, has become an essential tool in the development of IT systems (Sarker, 2021). Previous research has revealed that DL has completely changed many facets of

IT infrastructure by allowing machines to learn from enormous volumes of data and improve over time, with specific roles such as enhancing data processing capabilities, predicting maintenance and reliability, optimizing system performance, enhancing automation and efficiency, and strengthening cybersecurity measures (Ahmed S. F. et al., 2023; Sarker, 2021).

According to Shi (2019), DL approaches have increased the ability to classify, recognize, detect, and describe. Particularly, DL is utilized in the classification of images, speech recognition, object detection, and content description. DL is currently being advanced by several developments including algorithmic advancements which have enhanced the efficacy of DL-related techniques, new methods for machine learning that have increased model accuracy, and novel kinds of neural networks that have been created that operate well for tasks like picture classification and text translation (Wong, 2021). Usually, a lot more data, such as text from social media, medical notes, investigative transcripts, and streaming data from the IoT, is available for use, so as to develop neural networks with numerous deep layers. Additionally, computational advances in distributed cloud computing and graphics processing units have allowed access to enormous amounts of computing power to develop deep algorithms.

More dynamic behaviour can be added to analytics with significant potential attributable to the dynamic nature of DL methods, which allows them to continuously develop and react to changes in the underlying information pattern (Wang, 2019). A possible approach is to render customer analytics more personalized, while also enhancing accuracy and performance in applications where neural networks have been utilized for a long time (Haleem et al., 2022). This way, better computational power and improved algorithms can be added for additional depth. Although DL techniques are now mostly used in cognitive computing applications, they also have a lot of potential for use in more conventional analytics applications such as time series analysis. According to Krizhevsky et al., (2012), deep neural networks can help with transcription issues with speech-to-text. Applying deep neural networks resulted in a reduction of the word error rate of almost 10% as compared to

International Journal of Computer Applications Technology and Research
Volume 13–Issue 08, 73 – 89, 2024, ISSN:-2319–8656
DOI:10.7753/IJCATR1308.1008

normal approaches. They also removed roughly ten stages from the feature engineering, modelling, and data preprocessing processes. When compared to feature engineering, the significant performance improvements and time savings indicate a paradigm change.

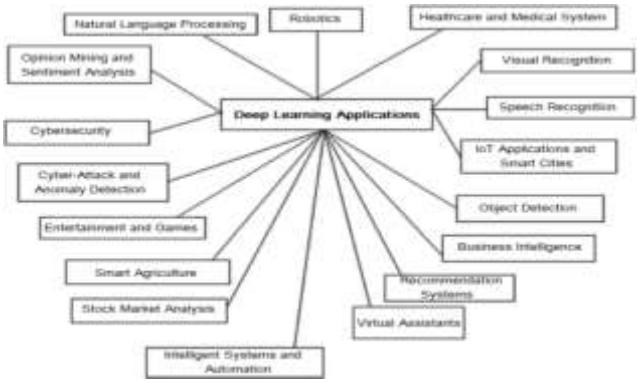

Figure 1. Applications of Deep Learning

(Sarker, 2021)

International Journal of Computer Applications Technology and Research
Volume 13–Issue 08, 73 – 89, 2024, ISSN:-2319–8656
DOI:10.7753/IJCATR1308.1008

Table 1. AI and DL Applications as Used in Different Sectors

Sectors	Uses/Advantages	References
Automated Driving	Employed by researchers in the automotive industry to automatically recognize items, like traffic signals and stop signs. DL is also used to identify pedestrians, which reduces the number of accidents.	(Iftikhar et al., 2022; He et al., 2021; Gupta et al., 2021)
Healthcare and Medical research	Cancer researchers are using DL to automatically detect cancer cells. Specifically, UCLA researchers developed a cutting-edge microscope that produces a high-dimensional data set that is utilized to precisely identify cancer cells using a deep learning application.	(Long et al., 2015; Kumar et al., 2021; Schwertner, 2017)
Aerospace and Defence	Detection of items from satellite images that pinpoint regions of interest and determine whether places are secure or dangerous for military personnel.	(Hartmann et al., 2015)
Electronics	For speech translation and automated hearing such as powering voice-activated home help systems that are aware of specific preferences.	(Irugalbandara et al., 2023; Seligman & Waibel, 2019)
Industrial Automation	Assisting in improving worker safety around heavy machinery by automatically recognizing when people or objects are within a dangerous distance of equipment.	(Fang et al., 2018; Su et al., 2015)
Educational	Adaptive learning systems driven by AI analyze student data to personalize learning experiences by offering recommendations and information that are specific to each student's needs. It also reduces human labour and boosts operational efficiency by automating administrative duties including scheduling, grading, and student enrolling.	(Koedinger et al., 2012; Martin, 2020)

Retail and commerce	The efficiency and profitability of inventory management for retailers can be enhanced by AI-based demand forecasting models. The effectiveness and affordability of AI-powered chatbots in raising customer satisfaction and service standards for e-commerce and retail enterprises.	(Fildes et al. 2019; He et al. 2017)
Manufacturing	AI is useful for robotics automation, supply chain management, quality control, and predictive maintenance. AI-powered image recognition systems improve quality control procedures by detecting errors faster and more accurately than human inspection.	(Amirkolaii 2017; Min et al., 2019)
Telecommunication	AI is utilized in marketing, customer service, network management, and optimization in telecommunication. It is mostly used in network management, where algorithms analyze massive volumes of data to forecast possible faults, optimize network performance, and dynamically distribute resources for increased efficiency and dependability.	(Kadiyala et al., 2024)
Banking	AI-powered chatbots and virtual assistants are employed to answer standard client questions. Banks can execute high quantities of transactions quickly and accurately using AI algorithms in back-office tasks including data input, fraud detection, and transaction monitoring.	(Turksen et al., 2024)

4. Impact on Business Operations

Previous research has shown that the integration of AI and DL into business operations has led to substantial improvements in efficiency and productivity. Ultimately, these technologies streamline processes by automating routine and repetitive tasks, which not only reduces the time required to complete them but also minimizes human errors (Elahi et al., 2023; Nawaz et al., 2024). Several of the main effects of AI on business operations are as follows: Enhanced customer experience, improved decision-making processes, and task automation are all made possible by AI.

Improved decision-making

AI and deep learning significantly enhance decision-making capabilities by providing businesses with insights and predictive analytics. These technologies can process vast amounts of data from various sources, identify patterns and trends, and generate actionable insights that inform strategic decisions (Adesina et al., 2024). Furthermore, as stated by Oladele et al., (2024) AI empowers businesses to anticipate and adapt to changes, mitigate risks, and seize new opportunities more effectively, which would eventually lead to better business outcomes and competitive advantage.

Increased productivity and efficiency

According to Muritala et al., (2024), technological innovation can be supported cross secure digital environments. Specifically, AI can automate repetitive tasks and processes, freeing up employees' time to concentrate on more complex tasks requiring human skills, such as creativity and critical thinking. This can result in higher-level tasks requiring human skills, like critical thinking, which can increase productivity and efficiency in business operations (Hamada et al., 2021).

Enhanced customer experience

AI can personalize customer interactions and improve customer service through chatbots, voice assistants, and other AI-powered tools. This can lead to higher customer satisfaction and loyalty. AI-powered chatbots and virtual assistants can provide 24/7 customer support and personalized recommendations based on individual preferences and past behaviour.

AI and DL has a significant impact on many aspects relating to business which goes beyond efficiency or design automation. AI is capable

of matching and sometimes surpassing human intelligence. Some of the most notable applications of AI include virtual assistants, personalized medicine, and driverless cars. It has fundamentally altered how we interact with technology and how we live, work, and conduct business. Additionally, AI has become so important to business that it is driving the digital transformation process by enabling companies to improve their operations and generate new sources of revenue. By applying AI-powered analytics, businesses can efficiently identify relevant information from massive data sets, making timely decisions and eliminating unnecessary procedures. AI also assists in eliminating unnecessary tasks, freeing up time to concentrate on more important tasks like business planning and innovation. Conversely, the emergence of AI raises important moral and societal questions. For example, policies and ethics should address issues like privacy, employment displacement, prejudice in algorithms, and the risk associated with powerful AI. In actuality, AI must serve humanity's highest good, which makes it extremely important.

5. Conclusion

AI and DL adoption in business is a revolutionary process that presents both workforce and ethical issues in addition to significant benefits. Previous research as highlighted above has shown how AI has the power to transform operations, improve decision-making, and stimulate creativity. Therefore, to effectively harness the potential of AI, organizations must adopt a balanced approach that takes worker consequences into account as they continue to integrate this technology. It was also discovered that the process of using AI in business is complex and influenced by a variety of variables. This is mainly due to the fact that a number of factors come into play, including workforce readiness, organizational leadership, culture, resource availability, perceived benefits, regulatory concerns, data security, and technological evaluation. Organizations may understand the revolutionary potential of AI by navigating the complicated adoption with an awareness of these facets. Finally, as businesses develop, they must embrace the potential of AI and DL while also reducing the potential hazards associated with it.

References

Adesina, A., Iyelolu, V., & Okpeke, P. (2024). Leveraging predictive analytics for strategic decision-making: Enhancing business performance through data-driven insights. *World Journal of Advanced Research and Reviews*, *22*(3), 1927–1934. https://doi.org/10.30574/wjarr.2024.22.3.1961

Ahmed S. F., Bin, S., Hassan, M., Mahtabin Rodela Rozbu, Taoseef Ishtiak, Rafa, N., M. Mofijur, Ali, & Gandomi, A. H. (2023). Deep learning modelling techniques: current progress, applications, advantages, and challenges. *Artificial Intelligence Review*, *56*. https://doi.org/10.1007/s10462-023-10466-8

Ahmed, N., Ngadi, A. bin, Sharif, J. M., Hussain, S., Uddin, M., Rathore, M. S., Iqbal, J., Abdelhaq, M., Alsaqour, R., Ullah, S. S., & Zuhra, F. T. (2022). Network Threat Detection Using Machine/Deep Learning in SDN-Based Platforms: A Comprehensive Analysis of State-of-the-Art Solutions, Discussion, Challenges, and Future Research Direction. *Sensors*, *22*(20), 7896. https://doi.org/10.3390/s22207896

Alahi, M. E. E., Sukkuea, A., Tina, F. W., Nag, A., Kurdthongmee, W., Suwannarat, K., & Mukhopadhyay, S. C. (2023). Integration of IoT-Enabled Technologies and Artificial Intelligence (AI) for Smart City Scenario: Recent Advancements and Future Trends. *Sensors*, *23*(11), 5206. MDPI. https://doi.org/10.3390/s23115206

Almaz A. F., Elsayed, Mohab Taher Abdelfatah, & Islam Rafaat Mohamed. (2024). The Future Role of Artificial Intelligence (AI) Design's Integration into Architectural and Interior Design Education is to Improve Efficiency, Sustainability, and Creativity. *Civil Engineering and Architecture*, *12*(3), 1749–1772. https://doi.org/10.13189/cea.2024.120336

Amirkolaii, K. N., Baboli, A., Shahzad, M. K., & Tonadre, R. (2017). Demand Forecasting for Irregular Demands in Business Aircraft Spare Parts Supply Chains by using Artificial Intelligence (AI). *IFAC-PapersOnLine*, *50*(1), 15221–15226. https://doi.org/10.1016/j.ifacol.2017.08.2371

Demertzis K., Iliadis, L. S., & Pimenidis, E. (2020). Large-Scale Geospatial Data Analysis: Geographic Object-Based Scene Classification in Remote Sensing Images by GIS and Deep Residual Learning. *Proceedings of the International Neural Networks Society*, 274–291. https://doi.org/10.1007/978-3-030-48791-1_21

Dunsin, D., Ghanem, M. C., Ouazzane, K., & Vassilev, V. (2024). A comprehensive analysis of the role of artificial intelligence and machine learning in modern digital forensics and incident response. *Forensic Science International: Digital Investigation*, *48*, 301675. https://doi.org/10.1016/j.fsidi.2023.301675

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., & Carlson, J. (2021). Setting the Future of Digital and Social Media Marketing research: Perspectives and Research Propositions. *International Journal of Information Management*, *59*(1), 1–37. Sciencedirect. https://doi.org/10.1016/j.ijinfomgt.2020.102168

Elahi, M., Afolaranmi, S. O., Lastra, M., & Pérez, A. (2023). A comprehensive literature review of the applications of AI techniques through the lifecycle of industrial equipment. *Discover Artificial Intelligence*, *3*(1). https://doi.org/10.1007/s44163-023-00089-x

Fang, W., Ding, L., Zhong, B., Love, P. E. D., & Luo, H. (2018). Automated detection of workers and heavy equipment on construction sites: A convolutional neural network approach. *Advanced Engineering Informatics*, *37*, 139–149. https://doi.org/10.1016/j.aei.2018.05.003

Fildes, R., Goodwin, P., & Lawrence, M. (2019). *The state of demand forecasting technology: Results of a global survey of forecasting practitioners*. *35*(1), 103–114.

Gartner Inc. (2021). Gartner. https://www.gartner.com/en/newsroom/press-releases/2021-05-19-gartner-says-70-percent-of-organizations-will-shift-their-focus-from-big-to-small-and-wide-data-by-2025

Gupta, A., Anpalagan, A., Guan, L., & Khwaja, A. S. (2021). Deep learning for object detection and scene perception in self-driving cars: Survey, challenges, and open issues. *Array*, *10*(100057), 100057. https://doi.org/10.1016/j.array.2021.100057

Haleem, A., Javaid, M., Qadri, M. A., Singh, R. P., & Suman, R. (2022). Artificial Intelligence (AI) Applications for marketing: a literature-based Study. *International Journal of Intelligent Networks*, *3*(3), 119–132. sciencedirect. https://doi.org/10.1016/j.ijin.2022.08.005

Hamada, M., Temirkhanova, D., Serikbay, D., Salybekov, S., & Omarbek, S. (2021). Artificial Intelligence to Improve the Business Efficiency and Effectiveness for Enterprises in Kazakhstan. *SAR Journal - Science and Research*, 34–41. https://doi.org/10.18421/sar41-06

Hartmann, B., King, W. P., & Narayanan, S. (2015, August). *Digital manufacturing: The revolution will be virtualized*. McKinsey & Company; McKinsey & Company. https://www.mckinsey.com/business-functions/operations/ourinsights/digital-manufacturing-the-revolution-will-be-virtualized

He, F., Paria Karami Olia, Rozita Jamili Oskouei, Hosseini, M., Peng, Z., & Touraj Banirostam. (2021). Applications of Deep Learning Techniques for Pedestrian Detection in Smart Environments: A Comprehensive Study. *Journal of Advanced Transportation*, *2021*(1), 1–14. https://doi.org/10.1155/2021/5549111

He, J., Liu, Y., Song, M., He, H., & Jiang, T. (2017). Learning to respond with deep neural networks for retrieval-based human-computer conversation system. *ArXiv PreprintarXiv:1709.00023*.

Heinonen, K., Kietzmann, J., & Pitt, L. F. (2020). Artificial intelligence and machine learning in service management. *Journal of Service Management*, *31*(2), 137–143. https://doi.org/10.1108/josm-03-2020-417

Iftikhar, S., Zhang, Z., Asim, M., Muthanna, A., Koucheryavy, A., & Abd El-Latif, A. A. (2022). Deep Learning-Based Pedestrian Detection in Autonomous Vehicles: Substantial Issues and Challenges. *Electronics*, *11*(21), 3551. https://doi.org/10.3390/electronics11213551

Irugalbandara, C., Naseem, A. S. M., Perera, S., Sithamparanathan Kiruthikan, & Velmanickam Logeeshan. (2023). A Secure and Smart Home Automation System with Speech Recognition and Power Measurement Capabilities. *Sensors*, *23*(13), 5784–5784. https://doi.org/10.3390/s23135784

Iyanuoluwa, D., Ndubuisi, L., Franca, O., Owolabi, R., Sunday, T., & Adura, R. (2024). AI-DRIVEN PREDICTIVE ANALYTICS IN RETAIL: A REVIEW OF EMERGING TRENDS AND CUSTOMER ENGAGEMENT STRATEGIES. *International Journal of Management & Entrepreneurship Research*, *6*(2), 307–321. https://doi.org/10.51594/ijmer.v6i2.772

Jha, A. K., Ghimire, A., Thapa, S., Jha, A. M., & Raj, R. (2021, January 1). *A Review of AI for Urban Planning: Towards Building Sustainable Smart Cities*. IEEE Xplore. https://doi.org/10.1109/ICICT50816.2021.9358548

Kadiyala, C. K., Gangarapu, S., & Chilukoori, S. S. R. (2024). AI-Powered Network Automation: The Next Frontier in Network Management. *Journal of Advanced Research Engineering and Technology (JARET)*, *3*(1).

Kiran, D. R. (2019). Internet of Things. *Production Planning and Control*, 495–513. https://doi.org/10.1016/b978-0-12-818364-9.00035-4

Koedinger, K. R., Corbett, A. T., & Perfetti, C. (2012). The Knowledge-Learning-Instruction Framework: Bridging the Science-Practice Chasm to Enhance Robust Student Learning. *Cognitive Science*, *36*(5), 757–798. https://doi.org/10.1111/j.1551-6709.2012.01245.x

Korke, P., Gobinath, R., Shewale, M., & Khartode, B. (2023). Role of Artificial Intelligence in Construction Project Management. *E3S Web of Conferences*, *405*, 04012. https://doi.org/10.1051/e3sconf/202340504012

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Banegas, N. C., & Tierno, N. R. (2021). Digital Transformation: an Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3), 1–15. Sagepub. https://doi.org/10.1177/21582440211047576

Krizhevsky, A., Ilya Sutskever, & Hinton, G. E. (2012). ImageNet Classification with Deep Convolutional Neural Networks. *Neural Information Processing Systems*, *25*, 1097–1105.

Kumar, V., Ashraf, A. R., & Nadeem, W. (2024). AI-powered marketing: What, where, and how? *International Journal of Information Management*, *77*, 102783–102783. https://doi.org/10.1016/j.ijinfomgt.2024.102783

Kumar, V., Ramachandran, D., & Kumar, B. (2021). Influence of new-age technologies on marketing: A research agenda. *Journal of Business Research*, *125*(125), 864–877.

Long, J., Shelhamer, E., & Darrell, T. (2015). Fully Convolutional Networks for Semantic Segmentation. *ArXiv (Cornell University)*. https://doi.org/10.48550/arxiv.1411.4038

Martin, F. (2020). *The Role of Artificial Intelligence in the Transformation of Higher Education*. EDUCAUSE Review.

McAfee, A., & Brynjolfsson, E. (2012). Big Data: The Management Revolution. *Harvard Business Review*, *90*(10), 60, 98. https://www.scirp.org/reference/referencespapers?referenceid=1644568

McMillan, L., & Varga, L. (2022). A review of the use of artificial intelligence methods in infrastructure systems. *Engineering Applications of Artificial Intelligence*, *116*. https://doi.org/10.1016/j.engappai.2022.105472

Mihardjo, L. W. W., Sasmoko, S., Alamsjah, F., & Elidjen, E. (2019). Digital leadership role in developing business model innovation and customer experience orientation in industry 4.0. *Management Science Letters*, *9*(11), 1749–1762. https://doi.org/10.5267/j.msl.2019.6.015

Min, Q., Lu, Y., Liu, Z., Su, C., & Wang, B. (2019). Machine Learning based Digital Twin Framework for Production Optimization in Petrochemical Industry. *International Journal of Information Management*, *49*, 502–519. https://doi.org/10.1016/j.ijinfomgt.2019.05.020

Muritala A., Anawansedo, S., Yusuf Ademola Sodiq, & Oladayo Tosin Akinwande. (2024). Driving Technological Innovation for a Resilient Cybersecurity Landscape. *International Journal of Latest Technology in Engineering Management & Applied Science*, *XIII*(IV), 126–133. https://doi.org/10.51583/ijltemas.2024.130414

Nawaz, N., Arunachalam, H., Pathi, B. K., & Gajenderan, V. (2024). The adoption of artificial intelligence in human resources management practices. *International Journal of Information Management Data Insights*, *4*(1), 100208–100208. https://doi.org/10.1016/j.jjimei.2023.100208

Odunaiya, O. G., Nwankwo, E. E., Okoye, C. C., Scholastica, U. C., Odunaiya, O. G., Nwankwo, E. E., Okoye, C. C., & Scholastica, U. C. (2024). Behavioral economics and consumer protection in the U.S.: A review: Understanding how psychological factors shape consumer policies and regulations. *International Journal of Science and Research Archive*, *11*(1), 2048–2062. https://doi.org/10.30574/ijsra.2024.11.1.0274

Oladele I., Orelaja A., & Akinwande O. T. (2024). Ethical Implications and Governance of Artificial Intelligence in Business Decisions: A Deep Dive into the Ethical Challenges and Governance Issues Surrounding the Use of Artificial Intelligence in Making Critical Business

Decisions. *International Journal of Latest Technology in Engineering Management & Applied Science*, *XIII*(II), 48–56. https://doi.org/10.51583/ijltemas.2024.130207

Oluleye, B. I., Chan, D. W. M., & Antwi-Afari, P. (2022). Adopting Artificial Intelligence for enhancing the implementation of systemic circularity in the construction industry: A critical review. *Sustainable Production and Consumption*, *35*(16). https://doi.org/10.1016/j.spc.2022.12.002

Prifti, V. (2022). Optimizing Project Management using Artificial Intelligence. *European Journal of Formal Sciences and Engineering*, *5*(1), 29. https://doi.org/10.26417/667hri67

Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five Recommendations for the Digitally Conscious Firm. *Business Horizons*, *63*(6), 825–839. Sciencedirect.

Sarker, I. H. (2021). Deep Learning: a Comprehensive Overview on Techniques, Taxonomy, Applications and Research Directions. *SN Computer Science*, *2*(6). Springer. https://doi.org/10.1007/s42979-021-00815-1

Schwertner, K. (2017). Digital Transformation of Business. *Trakia Journal of Science*, *15*(1), 388–393. https://doi.org/10.15547/tjs.2017.s.01.065

Seligman, M., & Waibel, A. (2019). Advances in Speech-to-Speech Translation Technologies. *Cambridge University Press EBooks*, 217–251. https://doi.org/10.1017/9781108525695.012

Serrano, W. (2020). Big Data in Smart Infrastructure. *Advances in Intelligent Systems and Computing*, 703–732. https://doi.org/10.1007/978-3-030-55187-2_51

Shamim, D. M. M. I. (2024). Artificial Intelligence in Project Management: Enhancing Efficiency and Decision-Making. *International Journal of Management Information Systems and Data Science*, *1*(1), 1–6. https://doi.org/10.62304/ijmisds.v1i1.107

Shi, Z. (2019). Cognitive Machine Learning. *International Journal of Intelligence Science*, *09*(04), 111–121. https://doi.org/10.4236/ijis.2019.94007

Son, T. H., Weedon, Z., Yigitcanlar, T., Sanchez, T., Corchado, J. M., & Mehmood, R. (2023). Algorithmic Urban Planning for Smart and Sustainable Development: Systematic Review of the Literature. *Sustainable Cities and Society*, *94*, 104562. https://doi.org/10.1016/j.scs.2023.104562

Su, X., Pan, J., & Grinter, M. (2015). Improving Construction Equipment Operation Safety from a Human-centered Perspective. *Procedia Engineering*, *118*, 290–295. https://doi.org/10.1016/j.proeng.2015.08.429

Tapscott, D. (2015). The digital economy: rethinking promise and peril in the age of networked intelligence. *Choice Reviews Online*, *52*(09), 52–488352–4883. https://doi.org/10.5860/choice.189120

Trunk, A., Birkel, H., & Hartmann, E. (2020). On the current state of combining human and artificial intelligence for strategic organizational decision making. *Business Research*, *13*(1). https://link.springer.com/article/10.1007/s40685-020-00133-x

Turksen U. , Benson, V., & Bogdan Adamyk. (2024). Legal implications of automated suspicious transaction monitoring: enhancing integrity of AI. *Journal of Banking Regulation*. https://doi.org/10.1057/s41261-024-00233-2

Vaska, S., Massaro, M., Bagarotto, E. M., & Dal Mas, F. (2021). The Digital Transformation of Business Model Innovation: A Structured Literature Review. *Frontiers in Psychology*, *11*. frontiersin. https://doi.org/10.3389/fpsyg.2020.539363

Veldhoven, Z. V., & Vanthienen, J. (2021). Digital transformation as an interaction-driven perspective between business, society, and technology. *Electronic Markets*, *32*(32).

https://doi.org/10.1007/s12525-021-00464-5

Wang, R. (2019). Research on Image Generation and Style Transfer Algorithm Based on Deep Learning. *Open Journal of Applied Sciences*, *09*(08), 661–672. https://doi.org/10.4236/ojapps.2019.98053

Wong, Y. (2021). ADVANCED DEEP LEARNING APPROACH AND APPLICATIONS. *International Journal of Information Technology*, *7*(5). http://ijitjournal.org/volume-7/issue-5/IJIT-V7I5P1.pdf

Yazdi, M., Zarei, E., Adumene, S., & Beheshti, A. (2024). Navigating the Power of Artificial Intelligence in Risk Management: A Comparative Analysis. *Safety*, *10*(2), 42. https://doi.org/10.3390/safety10020042

AUTHORS' INFORMATION

1. **Oladipo Olowe** is an accomplished IT professional with a master's degree in IT Management, specializing in the transformative impact of artificial intelligence (AI), machine learning, and deep learning technologies on global business landscapes. He has conducted unpublished research on the IT strategies adopted by industry giants Amazon and Airbnb, which have significantly contributed to their market leadership. This research highlights the effective deployment of AI and machine learning technologies in optimizing operational efficiencies and enhancing customer experiences.

2. **Happy Iguare** is a seasoned professional specializing in data science, holding a Master's degree in Advanced Computing and a Bachelor's degree in Actuarial Science. With over three years of experience in data management and modeling, Happy excels at driving company growth and profitability through advanced business strategies and data analytics. Currently, Happy works as a Research Data Analyst at ICF International Inc., where she plays a pivotal role in overseeing data integrity and statistical analysis, transforming qualitative and quantitative data into actionable insights.

3. **Osei Safo** is a researcher and skilled data analyst with a strong foundation in economics, data analysis and informatics. He holds a Master of Informatics with a concentration in Quantitative Economics and Data Analytics from Emporia State University and a Bachelor of Education in Economics from the University of Cape Coast, Ghana.

4. **Thomas Andrew Walugembe** holds a bachelor's degree in electrical engineering and a master's degree in computer science with a concentration in Software Engineering. Skilled in full-stack Java development, Thomas excels in creating and maintaining enterprise web applications, developing deep learning models, and implementing AI algorithms.