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RESEARCH PAPER

Impact of Artificial Intelligence on Supply Chain Performance: Mediation Role of Supply Chain Resilience

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ABSTRACT

Artificial intelligence is the fastest-growing technology in the current era. Its applications are spreading across all the industries. Every industry across the globe is transforming its operation from manual-based to artificial intelligence-based. Artificial intelligence-based technologies reduce the industry's human capital cost. This study aims to investigate the impact of artificial intelligence on supply chain performance. This study also aims to identify the role supply chain resilience plays. A quantitative-based approach was adopted to answer the questions raised. Primary data was gathered from 435 supply chain managers of different industries across Pakistan by a closed-ended questionnaire through judgmental sampling. The gathered data was analyzed via SmartPLS. From the results of this study, it was concluded that artificial intelligence-based technology has a significant impact on the performance of the supply chain departments across all the industries in Pakistan. The findings further also show that supply chain resilience plays a vital role in bridging the connection between artificial intelligence and supply chain performance. There are several recommendations for both the future researchers as well as for the industry management like the implantation of AI in industry and further exploratory study of this perspective.

KEYWORDS Artificial Intelligence, Supply Chain Performance, Supply Chain Resilience

Introduction

Artificial intelligence (AI) is reshaping the supply chain industry, bringing transformative advancements that enhance efficiency, accuracy, and resilience across all levels of supply chain management (Jan et al., 2023). The growing complexity of global markets, characterized by unpredictable demand patterns, intricate logistics networks, and heightened customer expectations, has necessitated the adoption of innovative technologies. Through its ability to process vast amounts of data, uncover patterns, and make intelligent predictions, AI offers unprecedented capabilities to address these challenges. It is pivotal in optimizing critical supply chain functions such as demand forecasting, inventory management, production planning, transportation, and customer engagement (Suseno et al., 2023). By enabling real-time data processing and predictive analytics, AI empowers businesses to shift from reactive decision-making to proactive and predictive approaches, allowing for more robust and dynamic operations (Pereira et al., 2023).

Demand forecasting is one of the key areas in which AI has proven its value. Traditional forecasting methods often fail to capture the nuances of market trends and external influences such as economic fluctuations or seasonal changes. AI-driven

forecasting tools, powered by machine learning algorithms, analyze historical data alongside real-time variables to accurately predict demand. This precision helps companies avoid costly issues like overstocking or understocking, ensuring optimal inventory levels and reducing waste (Kot et al., 2021). For instance, retail giants use AI to align their inventory with consumer demand, allowing for efficient stock replenishment and improved customer satisfaction. Similarly, AI is revolutionizing inventory management by employing intelligent systems that monitor stock levels, predict replenishment needs, and automate procurement processes. These capabilities enhance supply chain efficiency and contribute to significant cost savings.

AI enhances operational efficiency in manufacturing and production planning by optimizing scheduling, resource allocation, and quality control. Intelligent algorithms can analyze production data to identify inefficiencies, suggest process improvements, and anticipate maintenance needs. Predictive maintenance, enabled by AI, is critical in reducing downtime and avoiding costly disruptions by identifying potential equipment failures before they occur. Additionally, AI-powered robotics and automation streamline manufacturing processes, reducing human error and increasing productivity. This integration of AI into production systems enhances efficiency and allows for greater flexibility in meeting fluctuating customer demands. Logistics and transportation, which form the backbone of supply chain operations, have also undergone significant transformations with the advent of AI. Dynamic route optimization algorithms analyze real-time traffic patterns, weather conditions, and delivery constraints to determine the most efficient delivery routes (Jaweria et al., 2023). This capability reduces transportation costs, minimizes delivery times, and enhances reliability. Autonomous vehicles and AI-powered drones further revolutionize last-mile delivery by improving speed and cost efficiency while addressing labor shortages. Real-time tracking and predictive analytics enable businesses to monitor shipments, identify potential delays, and take corrective actions proactively, ensuring smooth logistics operations.

One of the most significant contributions of AI to the supply chain industry is its ability to provide end-to-end visibility and enhance risk management. Supply chains often involve multiple stakeholders, including suppliers, manufacturers, distributors, and retailers, making it challenging to achieve seamless coordination. AI integrates data from various sources to offer a holistic view of the supply chain, identifying bottlenecks and inefficiencies. Moreover, AI-powered systems analyze historical and real-time data to predict potential risks, such as supplier failures, natural disasters, or geopolitical disruptions. This foresight allows businesses to develop contingency plans and build resilient supply chains capable of withstanding unexpected challenges. AI also plays a crucial role in improving customer-centric strategies. In an era where customer expectations are at an all-time high, businesses must deliver personalized experience and exceptional service. AI analyzes consumer behavior, preferences, and feedback to tailor supply chain operations accordingly. From recommending products and predicting purchase patterns to optimizing delivery schedules and providing real-time updates, AI enhances the overall customer experience. By leveraging AI, companies can meet and exceed customer expectations, fostering loyalty and driving growth (Chang et al., 2024).

Despite its transformative potential, adopting AI in supply chain management is not without challenges. High implementation costs remain a significant barrier, especially for small and medium-sized enterprises (SMEs). Integrating AI requires substantial investment in technology infrastructure, data acquisition, and skilled personnel. Additionally, the complexity of AI systems can pose challenges regarding adoption and usability. Data security and privacy concerns are another critical issue, as supply chains handle sensitive information from multiple stakeholders. Ensuring the

ethical use of AI, particularly in terms of algorithmic transparency and bias, is essential for building trust and accountability. The future of AI in the supply chain industry looks promising as it continues to evolve and integrate with other emerging technologies. The Internet of Things (IoT) enhances AI's capabilities by providing real-time data from connected devices, enabling more accurate decision-making and improved supply chain visibility. Blockchain technology complements AI by enhancing transparency, traceability, and trust in complex supply networks. For instance, integrating AI and blockchain can ensure the authenticity of products, reduce fraud, and streamline processes in industries such as food and pharmaceuticals. Autonomous vehicles, drones, and advanced robotics are expected to revolutionize logistics and warehousing further, making operations faster, safer, and more cost-effective.

In conclusion, artificial intelligence redefines the supply chain industry by offering innovative solutions to longstanding challenges. From enhancing forecasting accuracy and operational efficiency to improving risk management and customer satisfaction, AI enables businesses to build intelligent, agile, and customer-centric supply chains. While challenges like cost, data security, and ethical concerns persist, the benefits outweigh the obstacles. Companies that embrace AI-driven innovations stand to gain a competitive edge in an increasingly dynamic and complex market environment. As AI technology continues to advance and integrate with other cutting-edge solutions, its impact on the supply chain industry will only grow, driving innovation and shaping the future of global commerce.

Literature Review

Integrating artificial intelligence (AI) into supply chain management has transformed the operational dynamics of global commerce. In an era characterized by rapid technological advancements, increasing market complexities, and heightened customer expectations, organizations face mounting pressure to enhance efficiency, agility, and resilience within their supply chains (Peng, et al., 2023). As a transformative technology, AI has emerged as a critical enabler, offering unprecedented capabilities to optimize operations, predict disruptions, and drive innovation. Beyond its direct impact on performance, AI also plays a pivotal role in strengthening supply chain resilience, mediating the broader relationship between AI and supply chain performance. The interplay between these elements is critical in understanding how AI contributes to supply chains' long-term competitiveness and sustainability in an increasingly volatile global landscape (Liu et al., 2022). Supply chain performance is a multifaceted construct encompassing operational efficiency, cost-effectiveness, service quality, and responsiveness to market changes. AI directly impacts these dimensions through its ability to process vast amounts of data, uncover patterns, and support intelligent decision-making. Machine learning algorithms, for example, enhance demand forecasting by analyzing historical sales data, market trends, and external factors such as economic indicators and weather patterns. This predictive capability allows businesses to align inventory levels with demand, reducing stockouts and overstocking, minimizing costs, and improving customer satisfaction. Similarly, AI-powered systems streamline inventory management, automating stock tracking, replenishment, and procurement processes. These efficiencies not only lower operational costs but also enhance the overall agility of supply chains (Li et al., 2023).

The role of AI extends beyond traditional supply chain operations, driving innovation in areas such as logistics, production planning, and customer engagement. In logistics, AI-powered tools optimize route planning by analyzing real-time traffic data, weather conditions, and delivery constraints. This dynamic routing capability reduces

transportation costs, shortens delivery times, and enhances service reliability (Wang et al., 2023). Autonomous vehicles and drones, enabled by AI, are further revolutionizing last-mile delivery, addressing labor shortages, and improving efficiency. AI enhances scheduling, resource allocation, and quality control in production planning by identifying inefficiencies and suggesting process improvements. Predictive maintenance systems powered by AI monitor equipment performance in real-time, identifying potential failures before they occur and reducing downtime and associated costs. Furthermore, AI-driven customer analytics enable businesses to gain deeper insight into consumer preferences and behaviors, facilitating personalized experiences and improved service levels (Ahmad, et al., 2023). While AI's direct impact on supply chain performance is well-documented, its role in enhancing supply chain resilience is equally significant. Supply chain resilience refers to the ability of a supply chain to anticipate, adapt to, and recover from disruptions while maintaining operational continuity. In an era of increasing uncertainty—marked by global pandemics, natural disasters, geopolitical tensions, and cyberattacks—resilience has become a critical determinant of supply chain performance. AI strengthens resilience by providing real-time visibility, predictive insights, and decision-making support. By integrating data from various sources across the supply chain, AI-powered systems offer a holistic view of operations, enabling organizations to identify vulnerabilities and respond proactively to potential disruptions (Peng, et al., 2023).

One of the ways AI enhances resilience is through predictive analytics, which helps organizations anticipate risks and develop contingency plans. For instance, machine learning algorithms can detect early warning signs of supplier issues, transportation delays, or shifts in market demand, allowing businesses to take preemptive actions (Dong et al., 2023). AI also facilitates scenario analysis, enabling supply chain managers to simulate different disruption scenarios and evaluate the effectiveness of mitigation strategies . This capability is precious in industries with complex global supply networks, where even minor disruptions can have cascading effects. Additionally, AI-driven tools enhance supply chain flexibility by supporting dynamic reconfiguration of operations. In a disruption, AI can identify alternative suppliers, reroute shipments, or adjust production schedules in real-time, minimizing the impact on performance. The mediating role of supply chain resilience is critical in linking AI to improved performance outcomes. While AI provides the tools and capabilities to enhance efficiency and agility, its full potential is realized only when organizations can leverage these capabilities to build resilient supply chains. Resilience acts as a buffer, enabling businesses to maintain performance despite external shocks and uncertainties. For example, an organization with AI-enabled predictive analytics may be better prepared to handle sudden demand spikes or supply shortages, ensuring that service quality and customer satisfaction are not compromised. Similarly, an AI-powered logistics network with real-time tracking and dynamic routing capabilities can quickly adapt to disruptions, maintaining delivery timelines and minimizing costs (Ahmad et al., 2022).

The relationship between AI, resilience, and performance is not merely linear but dynamic and iterative. As organizations deploy AI to enhance resilience, they gain valuable insights and experience that inform further improvements in AI applications. This feedback loop creates a virtuous cycle, where enhanced resilience drives better performance, supporting more significant investment in AI and resilience-building initiatives. Over time, this dynamic contributes to developing highly adaptive and competitive supply chains better equipped to navigate the challenges of an uncertain global environment (Ahmad et al., 2021). Despite its transformative potential, integrating AI into supply chain management is challenging. High implementation costs remain a

significant barrier, particularly for small and medium-sized enterprises (SMEs). Adopting AI requires substantial investment in technology infrastructure, data acquisition, and workforce training. Additionally, the effectiveness of AI systems depends on the quality and availability of data, which can vary widely across industries and regions (Alshammari et al., 2023; Luo et al., 2024). Data security and privacy concerns are also critical, given the sensitive nature of supply chain information. Ensuring the ethical use of AI, particularly algorithmic transparency and bias, is essential for building stakeholder trust. Furthermore, the interplay between AI and supply chain resilience highlights the importance of organizational culture and strategic alignment. Building resilience requires a long-term perspective and a willingness to invest in capabilities that may not yield immediate returns. Organizations must adopt a proactive mindset, emphasizing collaboration, continuous learning, and adaptability. This cultural shift is necessary to fully harness the benefits of AI and resilience in driving performance improvements (Ahmad, et al., 2023). The future of AI in supply chain management holds immense potential as the technology continues to evolve and integrate with other emerging innovations. The Internet of Things (IoT) enhances AI's capabilities by providing real-time data from connected devices, enabling more accurate decision-making and improved supply chain visibility. Blockchain technology complements AI by enhancing transparency, traceability, and trust in complex supply networks. For instance, integrating AI and blockchain can ensure the authenticity of products, reduce fraud, and streamline processes in industries such as food, pharmaceuticals, and luxury goods. Autonomous vehicles, drones, and advanced robotics are expected to revolutionize logistics and warehousing further, making operations faster, safer, and more cost-effective (Shahzad et al., 2023).

Additionally, AI algorithms and computational power advancements will enable more sophisticated applications, such as natural language processing for supplier negotiations, computer vision for quality control, and reinforcement learning for dynamic decision-making. These developments will expand the scope of AI in supply chain management, creating new opportunities for innovation and performance enhancement. However, successfully adopting these technologies will require a concerted effort to address the challenges associated with implementation, data management, and ethical considerations (Vrontis et al., 2023). In conclusion, artificial intelligence is a transformative force in supply chain management, driving significant improvements in performance while playing a critical role in building resilience. The interplay between AI and supply chain resilience highlights the importance of a holistic approach, where technology, organizational culture, and strategic alignment work together to create adaptive and competitive supply chains. While challenges remain, the potential benefits of AI far outweigh the obstacles, making it an indispensable tool for organizations seeking to navigate the complexities of the modern global market. As AI continues to evolve and integrate with other emerging technologies, its impact on supply chain performance and resilience is poised to grow, shaping the future of global commerce and ensuring the sustainability of supply chain operations in an increasingly uncertain world (AL-Shboul, 2024).

H1: Artificial intelligence has a significant impact on the supply chain performance

H2: Supply chain resilience mediates the impact of artificial intelligence on the supply chain performance

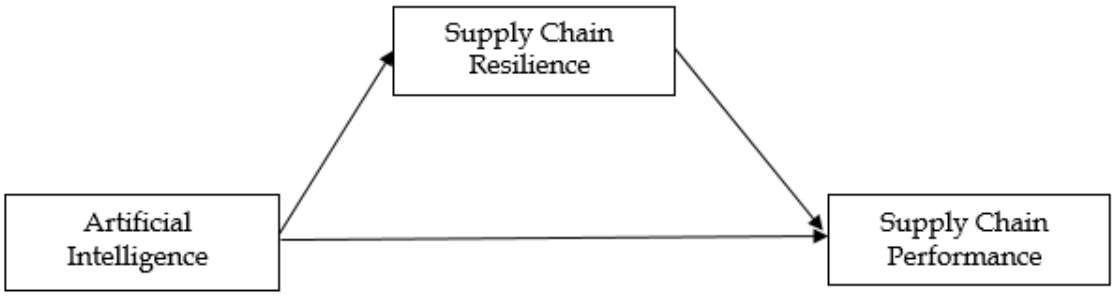

Figure 1: Research Model

Material and Methods

The Philosophical roots of this study are originated from the positivism paradigm. It is a pure scientific paradigm which works on the basic principles of the scientific method. Scientific paradigm is a paradigm which completely relies on numbers and rejects the concepts which are not measurable with numbers. As this study relies on the positivism paradigm, this completely relies on the data which are based on the numbers. A deductive approach was used to answer the question arises by the study. This study aims to investigate the impact of artificial intelligence on supply chain performance. This study also aims to identify the role supply chain resilience plays. A quantitative-based approach was adopted to answer the questions raised. The population of this study is composed of supply chain managers across the country. Primary data was gathered from 435 supply chain managers of different industries across Pakistan by a closed-ended questionnaire through judgmental sampling. The scales of the questionnaire was adopted from the prior studies considering the reliability and validity of the scales. The gathered data was analyzed via SmartPLS. Before the complete data collection, a pilot study was also conducted to pre- confirm the reliability and validity of the study. Ethical certificate was obtained for the study from the ethics board to consider the ethical limitations of the study.

Results and Discussion

Demographic Analysis

Table 1 of the respondent demography shows the demographic distribution of the research respondent. This shows that there are a total of 435 research respondents from which the primary data has been collected. The first section of the demography table shows the gender wise distribution of the respondents which shows that among the 435 respondents 76% were male and 24% were female. The next section of the table shows the age wise distribution of the respondents which shows that among the 435 respondents 39% were below the age of 30, 33% were at the age of 30 to 45 years while 28% were above at the age of 45 years.

Table 1
Respondent Demography

Gender	Number	Percentage
Male	330	76%
Female	105	24%
Total	435	100%
Age Group	**Number**	**Percentage**
Below 30 Years	167	39%

30 to 45 Years	145	33%
Above 45 Years	123	28%
Total	435	100%

Items Reliability

When analyzing the primary data, it is necessary to confirm the reliability and validity of the data. When using an approach based on the PLS Smart with variance based then there are two types of reliability named reliability and construct reliability. For the items reliability the measure used in the variance based approach is the outer loading values. The threshold value for the outer loading value is 0.7 and above. The table of the item's reliability shows that all the items have the outer loading values greater than the significance value indicates that the model has achieved the items reliability.

Table 2
Items Reliability

Construct	Items	Outer loading
Artificial Intelligence	AI1	0.743
	AI2	0.823
	AI3	0.844
	AI4	0.749
Supply Chain Performance	SP1	0.745
	SP2	0.767
	SP3	0.734
	SP4	0.887
Supply Chain Resilience	SR1	0.723
	SR2	0.883
	SR3	0.923
	SR4	0.834
	SR5	0.722

Construct reliability

The second measure of the reliability is the construct reliability. It explains the overall construct consistency. The measure used for the construct reliability is the composite reliability. The threshold value for the composite reliability is the 0.7 and above. The table of the composite reliability shows that all the constructs have the composite reliability value greater than the threshold value which indicates that all the constructs have achieved their reliability.

Table 3
Construct Reliability

	Composite reliability
Artificial Intelligence	0.803
Supply Chain Performance	0.783
Supply Chain Resilience	0.817

Convergent Validity

Validity is another measure for the primary data to be confirm before the data analysis. There are two common types of the validity test for the researcher using an

approach based on the SmartPLS. The first is the convergent validity which explains how much the items of the construct are related with each other. The measure used for the convergent validity is the AVE while the threshold value for the AVE is 0.5 and above. The table of the convergent validity shows that all the constructs have the AVE values greater than the threshold value which indicates that the model has achieved its convergent validity.

Table 4
Convergent Validity

Constructs	Average variance extracted (AVE)
Artificial Intelligence	0.573
Supply Chain Performance	0.594
Supply Chain Resilience	0.591

Discriminant Validity

Discriminant validity is another type of the validity in which the researcher measures how much the construct of the models are theoretically different from other construct of the model. The measure used for the discriminant validity is the HTMT ratios. The threshold value for the HTMT is the 0.85 and below. The table of the HTMT ratios shows that all the HTMT rations values are smaller than the threshold value which indicates that the model is discriminately valid.

Table 5
Discriminant Validity

	Heterotrait-monotrait ratio (HTMT)
AI <-> SR	0.453
AI <-> SP	0.419
SP <-> SR	0.623

Hypotheses Testing

Regression analysis is the most common technique used by the researchers when using an approach based on the cause and effect model to test the hypothesis. The measure used in the regression analysis are the t and p values. The threshold value for the significance of a relationship in t is 1.96 and above while for the p is 0.05 and less. The table of the hypothesis testing shows that there are two hypotheses both having the t values greater than the threshold value and the p value smaller than the threshold value which indicates that both of the relationships are significance. While the beta value for each relationship explains the strength of the relationship how much the cause is affecting the effect.

Table 6
Hypotheses Testing

Hypothesis	Beta	T statistics	P values	Decision
H1: AI -> SP	0.316	9.555	0.000	*Supported*
H2: AI -> SR -> SP	0.334	15.674	0.000	*Supported*

Coefficient of Determination

Coefficient of determination is a technique which explain the overall model impact. The measure used for the coefficient of determination is the R square. The table of the coefficient of determinations shows the model has the R square value for the

supply chain performance is 0.516 which shows that 51.6% on the supply chain performance is due to the artificial intelligence and supply chain resilience.

Table 7
R Square

	R-square	R-square adjusted
Supply Chain Performance	0.516	0.514
Supply Chain Resilience	0.345	0.351

Conclusion

Every industry across the globe is transforming its operation from manual-based to artificial intelligence-based. Artificial intelligence-based technologies reduce the industry's human capital cost. This study aims to investigate the impact of artificial intelligence on supply chain performance. This study also aims to identify the role supply chain resilience plays. From the results of this study, it was concluded that artificial intelligence-based technology has a significant impact on the performance of the supply chain departments across all the industries in Pakistan. The findings further also show that supply chain resilience plays a vital role in bridging the connection between artificial intelligence and supply chain performance.

Recommendations

There are several recommendations by the researchers for the further researchers as well as for the industry. For the management of the industry, it is recommended that artificial intelligence system plays a vital role for the proper functioning of the supply chain department so that's they have suggested implementing the AI based system in their industry to enhance the performance of the supply chain department. For further researcher it is suggested to do more qualitative research on this topic to further explore the new dimensions of the AI in the business sector, especially in the perspective of the supply chain department.

References

Ahmad, S. F., Alam, M. M., Rahmat, Mohd. K., Mubarik, M. S., & Hyder, S. I. (2022). Academic and Administrative Role of Artificial Intelligence in Education. *Sustainability*, *14*(3), 1101. https://doi.org/10.3390/su14031101

Ahmad, S. F., Alam, M. M., Rahmat, Mohd. K., Shahid, M. K., Aslam, M., Salim, N. A., & Al-Abyadh, M. H. A. (2023). Leading Edge or Bleeding Edge: Designing a Framework for the Adoption of AI Technology in an Educational Organization. *Sustainability*, *15*(8), 6540. https://doi.org/10.3390/su15086540

Ahmad, S. F., Han, H., Alam, M. M., Rehmat, Mohd. K., Irshad, M., Arraño-Muñoz, M., & Ariza-Montes, A. (2023). Impact of artificial intelligence on human loss in decision making, laziness and safety in education. *Humanities and Social Sciences Communications*, *10*(1), 311. https://doi.org/10.1057/s41599-023-01787-8

Ahmad, S. F., Rahmat, Mohd. K., Mubarik, M. S., Alam, M. M., & Hyder, S. I. (2021). Artificial Intelligence and Its Role in Education. *Sustainability*, *13*(22), 12902. https://doi.org/10.3390/su132212902

Alshammari, T. O., Ahmad, S. F., Abou Houran, M., Agrawal, M. K., Pulla, B. P., Nutakki, T. U. K., Albani, A., & Youshanlouei, H. M. (2023). Thermal energy simulation of the building with heating tube embedded in the wall in the presence of different PCM materials. *Journal of Energy Storage*, *73*, 109134. https://doi.org/10.1016/j.est.2023.109134

AL-Shboul, M. A. (2024). Artificial intelligence drivers' effect on willingness to adopt the human capital supply chain in manufacturing firms: an empirical investigation from developing countries – a mediation model. *Industrial Management & Data Systems*, *124*(10), 2919–2938. https://doi.org/10.1108/IMDS-12-2023-0977

Chang, P.-C., Zhang, W., Cai, Q., & Guo, H. (2024). Does AI-Driven Technostress Promote or Hinder Employees' Artificial Intelligence Adoption Intention? A Moderated Mediation Model of Affective Reactions and Technical Self-Efficacy. *Psychology Research and Behavior Management*, *Volume 17*, 413–427. https://doi.org/10.2147/PRBM.S441444

Dong, Y., Ahmad, S. F., Irshad, M., Al-Razgan, M., Ali, Y. A., & Awwad, E. M. (2023). The Digitalization Paradigm: Impacts on Agri-Food Supply Chain Profitability and Sustainability. *Sustainability*, *15*(21), 15627. https://doi.org/10.3390/su152115627

Jan, M., Jaweria, & Pireh, S. (2023). Artificial Intelligence is a Blessing or Curse for The Future Human Resource: A Conceptual Analysis. *Pakistan Social Sciences Review*, *7*(IV). https://doi.org/10.35484/pssr.2023(7-IV)27

Jaweria, Jan, M., & Mudasser, A. K. (2023). SWOT Analysis of Artificial Intelligence: Empirical Evidence from the Pharmaceutical Industry of Pakistan. *Pakistan Languages And Humanities Review*, *7*(III). https://doi.org/10.47205/plhr.2023(7-III)54

Kot, S., Hussain, H. I., Bilan, S., Haseeb, M., & Mihardjo, L. W. W. (2021). The Role Of Artificial Intelligence Recruitment And Quality To Explain The Phenomenon Of Employer Reputation. *Journal of Business Economics and Management*, *22*(4), 867–883. https://doi.org/10.3846/jbem.2021.14606

Li, C., Ahmad, S. F., Ahmad Ayassrah, A. Y. A. B., Irshad, M., Telba, A. A., Mahrous Awwad, E., & Imran Majid, M. (2023). Green production and green technology for sustainability: The mediating role of waste reduction and energy use. *Heliyon*, *9*(12), e22496. https://doi.org/10.1016/j.heliyon.2023.e22496

Liu, X., Ahmad, S. F., Anser, M. K., Ke, J., Irshad, M., Ul-Haq, J., & Abbas, S. (2022). Cyber security threats: A never-ending challenge for e-commerce. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.927398

Luo, J., Ahmad, S. F., Alyaemeni, A., Ou, Y., Irshad, M., Alyafi-Alzahri, R., Alsanie, G., & Unnisa, S. T. (2024). Role of perceived ease of use, usefulness, and financial strength on the adoption of health information systems: the moderating role of hospital size. *Humanities and Social Sciences Communications*, *11*(1), 516.

Peng, Y., Ahmad, S. F., Ahmad, A. Y. A. B., Al Shaikh, M. S., Daoud, M. K., & Alhamdi, F. M. H. (2023). Riding the Waves of Artificial Intelligence in Advancing Accounting and Its Implications for Sustainable Development Goals. *Sustainability*, *15*(19), 14165. https://doi.org/10.3390/su151914165

Peng, Y., Ahmad, S. F., Irshad, M., Al-Razgan, M., Ali, Y. A., & Awwad, E. M. (2023). Impact of Digitalization on Process Optimization and Decision-Making towards Sustainability: The Moderating Role of Environmental Regulation. *Sustainability*, *15*(20), 15156. https://doi.org/10.3390/su152015156

Pereira, V., Hadjielias, E., Christofi, M., & Vrontis, D. (2023). A systematic literature review on the impact of artificial intelligence on workplace outcomes: A multi-process perspective. *Human Resource Management Review*, *33*(1), 100857.

Shahzad, M. F., Xu, S., Naveed, W., Nusrat, S., & Zahid, I. (2023). Investigating the impact of artificial intelligence on human resource functions in the health sector of China: A mediated moderation model. *Heliyon*, *9*(11), e21818.

Suseno, Y., Chang, C., Hudik, M., & Fang, E. S. (2023). Beliefs, anxiety and change readiness for artificial intelligence adoption among human resource managers: the moderating role of high- performance work systems. In *Artificial Intelligence and International HRM* (pp. 144–171). Routledge.

Vrontis, D., Christofi, M., Pereira, V., Tarba, S., Makrides, A., & Trichina, E. (2023). Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review. In *Artificial Intelligence and International HRM* (pp. 172–201). Routledge. https://doi.org/10.4324/9781003377085-7

Wang, C., Ahmad, S. F., Bani Ahmad Ayassrah, A. Y. A., Awwad, E. M., Irshad, M., Ali, Y. A., Al-Razgan, M., Khan, Y., & Han, H. (2023). An empirical evaluation of technology acceptance model for Artificial Intelligence in E-commerce. *Heliyon*, *9*(8), e18349. https://doi.org/10.1016/j.heliyon.2023.e18349