Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/GC02.20240135
Published: December 01, 2024

Exploring the Factors Influencing Artificial Intelligence Tools Adoption in Omani Higher Education Sector

Shadhan Salim Al-Harmi
Department of Mechanical and Industrial Engineering
Sultan Qaboos University
Muscat, Sultanate of Oman
s130326@student.squ.edu.om

Mohamed Abdullah Al-Moqbali and Faisal Khalid Al-Yafaey
Department of Mechanical and Industrial Engineering
Sultan Qaboos University
Muscat, Sultanate of Oman
malmoqbali92@gmail.com , fai7272sal@gmail.com

Mohammed Othman
Assistant Professor
Department of Mechanical and Industrial Engineering
Sultan Qaboos University
Muscat 123, Sultanate of Oman
(m.othman@squ.edu.om)
and
Department of Industrial and Mechanical Engineering
An-Najah National University
Nablus, West Bank, Plaestine

Abstract

The quality of education is greatly improved using artificial intelligence (AI) technologies and tools. Many organizations across the globe have incorporated the use of AI tools to enhance their teaching methods and prepare themselves against pandemics and other disruptions. On the other hand, practitioners do not completely understand the factors that influence the application of these systems. Moreover, little research has examined the factors and challenges that facilitate the successful integration of artificial intelligence in higher education institutions in the Sultanate of Oman. As a result, there is a gap that this research identifies, defines, and assesses the key factors associated with AI integration in higher education. In this paper, we conducted semi-structured interviews with eight experts and extracted four factors. From these factors and challenges, we proposed a conceptual framework that was classified using the Technological, Organizational, and Environmental (TOE) framework and the Technology Acceptance Model (TAM) model. We used NVIVO software after the categorization and involved eight experts in gathering the relevant data. The major findings were four factors and challenges: data readiness, educational transformation, financial readiness, and ethical anxiety. The study proposed a conceptual framework to investigate relationships between the factors and challenges and developed propositions for each. These propositions are crucial in understanding how these relationships impact the adoption of AI tools in the higher education sector.

Keywords
Case Study, Artificial intelligence, Technology acceptance model, Higher Education and Oman, SDG4.

1. Introduction

The Sustainable Development Goal 4 (SDG 4: "Ensure inclusive, equitable quality education and promote lifelong learning opportunities for all" UN 2015) — aims to change lives through education and acknowledges that education is essential for development and achieving all SDGs. The rise of AI tools, like chatbots, in education promises enhanced learning experiences but raises concerns about academic integrity, as their misuse can undermine critical skills and ethical standards. Despite growing interest, there is a knowledge gap regarding the technological, organizational, and environmental factors critical for successful integration. The field of AI has observed significant growth in recent years. The intersection between AI and the education sector is growing, presenting new possibilities and challenges (Mustafa 2020). Education institutions are increasingly adopting and implementing AI to improve their teaching techniques. It is a fact that AI affects the way teachers deliver information and how students absorb it (Afify 2018). Personalized learning, variability in teaching, and accessibility are some potentials provided by adapting AI tools in education. Higher educational institutions (HEIs) should prioritize AI guidelines that adhere to academic standards to sustain their reputation in the academic community (Chan 2023). University students face various challenges, including time constraints, information overload, and a lack of timely feedback, which might limit their engagement and research progress (Mohd Isa and Ahmad 2018). Existing AI-powered research tools, while useful, sometimes lack the flexibility and customizability required to satisfy the diverse needs of university students. This study aims to identify factors and challenges for effective AI implementation using the Technological, Organizational, and Environmental (TOE) framework and the Technology Acceptance Model (TAM). Key steps include defining the technology, assessing user perceptions, and analyzing external influences, ultimately refining AI acceptance in educational settings.

1.1 Objectives
The main aim of this project is to explore the factors influencing AI tool adoption in the Omani higher education sector. The research objectives are as follows:

- To identify the factors and challenges of using AI tools in higher education.
- To propose a conceptual framework to clarify the relationship between AI tool factors and intention to adopt AI tools in the Omani higher education sector context.

2. Literature Review
The growth of AI has introduced new possibilities and challenges in education (Mustafa 2020). Institutions are increasingly adopting AI to enhance teaching methods, impacting how educators deliver content and students engage with it (Afify 2018). AI tools facilitate personalized learning, teaching variability, and improved accessibility. The COVID-19 pandemic accelerated this shift, prompting greater exploration of AI's adoption and its implications for educational institutions (Belhadi et al. 2024).

This brief literature review explains how artificial intelligence (AI) influences teaching and learning techniques. Furthermore, various factors and challenges affect the use of AI in the education sector. No study has addressed the drivers and limits impacting AI deployment in Omani higher education. This section reviews the factors and challenges affecting AI implementation in higher education, explaining their impact on AI adoption.

2.1 Data Readiness (DR)
Data is crucial for AI decision-making, and its quality directly affects AI's accuracy (Chui 2023)—a lack of data readiness limits AI adoption (Shippers 2023). DR involves having sufficient, relevant, high-quality data to support AI applications, such as student performance and assessment data, enabling personalized learning and helping educators track progress. Information can help answer issues, yet data can relate to (meaningless) symbols (Chen et al. 2009). Alter (2015) addresses AI data sources. In a previous study, Lee et al. (2018) examined the relationship between data and reliable, high-performing AI to help decision-makers make sound decisions. Tehrani et al. (2024) state that data availability, quality, relevance, and volume should all be considered when preparing data. To enhance education, AI needs a broad range of data types. Hence, this discussion leads to the following propositions:

P1: *Data readiness influences the perceived usefulness of AI tools in education.*

P2: *Data readiness influences the perceived ease of use of AI tools in education.*

2.2 Educational Transformation (ET)

AI enhances learning through various blended approaches, adapting to individual learning paths (Gupta and Bostrom 2009). Integrating AI requires aligning technology with educational needs (Grájeda et al. 2024). According to Gupta and Bostrom (2009), technology-driven systems encompass a range of blended learning approaches, such as computer- or web-based, instructor-led or self-paced, and group-based learning. By identifying and meeting the unique learning styles of each student, these strategies are crucial in assisting educators in improving the educational experiences of their students. Learning processes differ as people construct new ideas or concepts based on their past knowledge, skills, abilities, and experiences. Intelligent systems powered by artificial intelligence can recognize and adjust to these differences in student aptitudes and learning preferences (Gupta and Bostrom 2009). According to Alzahrani (2019), AI-based educational systems enhance student growth while maintaining the position of qualified teachers at the forefront of teaching. It is essential for the many departments that are positioned inside the business to share information to successfully carry out digital transformation (Lakshmi et al., 2023). Therefore, we propose the following propositions:

P3: Educational transformation influences the perceived usefulness of AI tools in education.
P4: Educational transformation influences the perceived ease of use of AI tools in education.

2.3 Financial Readiness (FR)

AI systems can be costly, and organizations often struggle to fund their implementation (Bergstein 2019). Financial readiness is critical for digital transformation (Min and Kim 2024). Depending on their features and scale, AI systems can be pretty expensive, perhaps in the billions of dollars. According to Bergstein (2019), many businesses typically struggle to secure the funding necessary to sustain their artificial intelligence (AI) systems, which makes them hesitant to be deployed. Because AI systems are expensive, organizations should evaluate their financial position as adopting them may be discouraged. Because appropriate infrastructure is rarely accessible, using it becomes costly. This is another barrier to AI's mainstream application (Chatterjee 2020). Being financially prepared is one of the most critical aspects of digital transformation (Min and Kim 2024). Accordingly, we propose the following:

P5: *Financial readiness influences the perceived usefulness of AI tools in education.*
P6: *Financial readiness influences the perceived ease of use of AI tools in education.*

2.4 Ethical Anxiety (EA)

Ethical concerns regarding AI adoption are significant, prompting calls for robust ethical frameworks (Bansal and Heath 2023). Addressing ethical issues is essential for effective AI use (Merhi 2023). Companies must carefully consider preventing ethical problems while adopting AI technologies. The possibility of ethical difficulties during and after the adoption is one of the significant obstacles to the efficient deployment of AI systems (Merhi 2023). The successful practical concepts of AI ethics are currently causing concern among governments, national organizations, and international organizations. The need for ethical norms in artificial intelligence is generally recognized across various organizational sectors, as indicated by the ethical challenges surrounding AI that influence both public and private enterprises (Jobin et al. 2019). One issue that may prevent people from embracing, using, or accepting technology is AI anxiety. It may lead people to overlook its ease of use and fail to appreciate its usefulness (Kaya et al. 2024). The previous discussion leads us to the following propositions:

P7**:** Ethical anxiety influences the perceived usefulness of AI tools in education.
P8**:** Ethical anxiety influences the perceived ease of AI tools in education.

2.5 Perceived Usefulness, Ease of Use, and Behavioral Intention

The relationships between ease of use, perceived usefulness, and behavioral intention have been validated (Davis 1989, Lin et al. 2011). The strong relationship between ease of use and perceived usefulness suggests that those who think a new technology is easy to use also perceive it to be particularly beneficial (Davis, 1989). According to Chen et al. (2013), they are the two most important constructs in the TAM model. Perceived usefulness reflects users' value in new technology (Kim et al. 2007). Factors like effectiveness and efficiency influence its perceived utility in education (Ahmad et al. 2017). Perceived ease of use affects user engagement and the overall learning experience

(Afify 2018). According to Chatterjee and Bhattacharjee (2020), artificial intelligence-based learning activities can potentially boost efficiency, particularly in higher education.

Professional growth and rewards are two factors that lead to usefulness. Rewards provide an external drive for teachers to experiment with and apply new technology. According to previous research, teachers' considerable usage of new technology is often motivated by awards and money from educational institutions (Harvey and Hurworth 2006; Ungar and Baruch 2016). On the other hand, professional development refers to the possibilities that educators provide for themselves through their work. Teachers can update their ideas and teaching methods to reflect current trends by learning new technologies, such as AI-based apps (Bhaskar and Gupta 2020). Based on the previous speech, the following propositions will be examined:

P9: *The perceived ease of use affects the perceived usefulness of AI.*
P10: *The perceived usefulness of AI affects the intention to adopt AI tools.*
P11: *The perceived ease of use of AI affects the intention to adopt AI tools.*

3. Methods

This section outlines the methodology to achieve the study's objectives, ensuring reliability and validity. A qualitative approach was employed to explore factors and challenges affecting AI adoption in Omani higher education, using thematic analysis to identify patterns. Eight AI experts, mostly from education, were selected through purposive sampling for semi-structured interviews.

The study followed a phenomenological method, requiring participants to have at least five years of AI experience. Interviews were recorded, transcribed, and analyzed with NVIVO software. The thematic analysis involved six phases: familiarization with data, generating codes, grouping codes into themes, and defining those themes for reporting. This methodology provides a clear understanding of the research process, facilitating evaluation of its applicability and accuracy. Detailed data analysis and conclusions will follow in subsequent sections.

3.1 Data Collection

This study adopts a qualitative research-method approach to answer the main question of the factors and challenges that affect the adoption of AI tools in Omani higher education. Data collection was done in November 2023. Using the phenomenological research method, we used purposive sampling to conduct semi-structured interviews with experts who met specific inclusion criteria. The study complies with the phenomenological method, which, according to (Morse 1994), recommends a sample size that exceeds six participants.

Furthermore, phenomenological research, as described by Creswell and Poth (2016), seeks to investigate the experiences and opinions of individuals regarding a specific phenomenon. In this approach, it is essential to thoroughly explore individuals' experiences and perceptions of the phenomenon. These criteria demanded that the experts possess practical experience in AI and its associated tools and technologies, and the experts that will be chosen should have at least five years of experience rather than having general or basic knowledge about AI. The interviews were systematically recorded, transcribed into Microsoft Word files, and subsequently imported into NVIVO 14, which was identified as appropriate software for qualitative data analysis. Thematic analysis was chosen as the suitable technique, aligning with Braun and Clarke's (2006) methodology, as it enables the researcher to uncover various interconnected concepts related to the studied variable. The interview questions were validated, and a sampling plan was developed for whom to interview. The interviews were conducted, and the data was collected by recording it through phone recording apps. The interview questions and data collected were transcribed from the recorded audio to written documents for analysis. After conducting interviews, the collected data is analyzed to look for similarities. Moreover, the codes related to these data are generated and combined in groups based on their similarities; these groups are known as themes.

4. Results and Analysis

This section will include the presentation of results, their explanation, and a discussion. Additionally, an explanation of the developed conceptual framework is provided. Data analysis was conducted using thematic analysis, which comprised six phases, and the NVIVO software tool was used for the study. The first step involved familiarizing with the data through many readings to identify information related to the research question. The second step involved generating codes in NVIVO from the data gathered from the interviews. These codes were small pieces of information

related to the research question. In the third step, themes were generated in NVIVO by grouping similar codes. The fourth step involved reviewing the themes to identify the candidates. In the fifth step, the themes were defined with names reflecting their grouping. The sixth step entailed documenting the results in the report and discussing the findings (Byrne 2021). Figure 1 shows the components, themes, and related codes for each theme, which are the output of the NVIVO program. All the codes represent the opinions and answers of the experts. Each theme will be provided with some explanations of its meaning and importance.

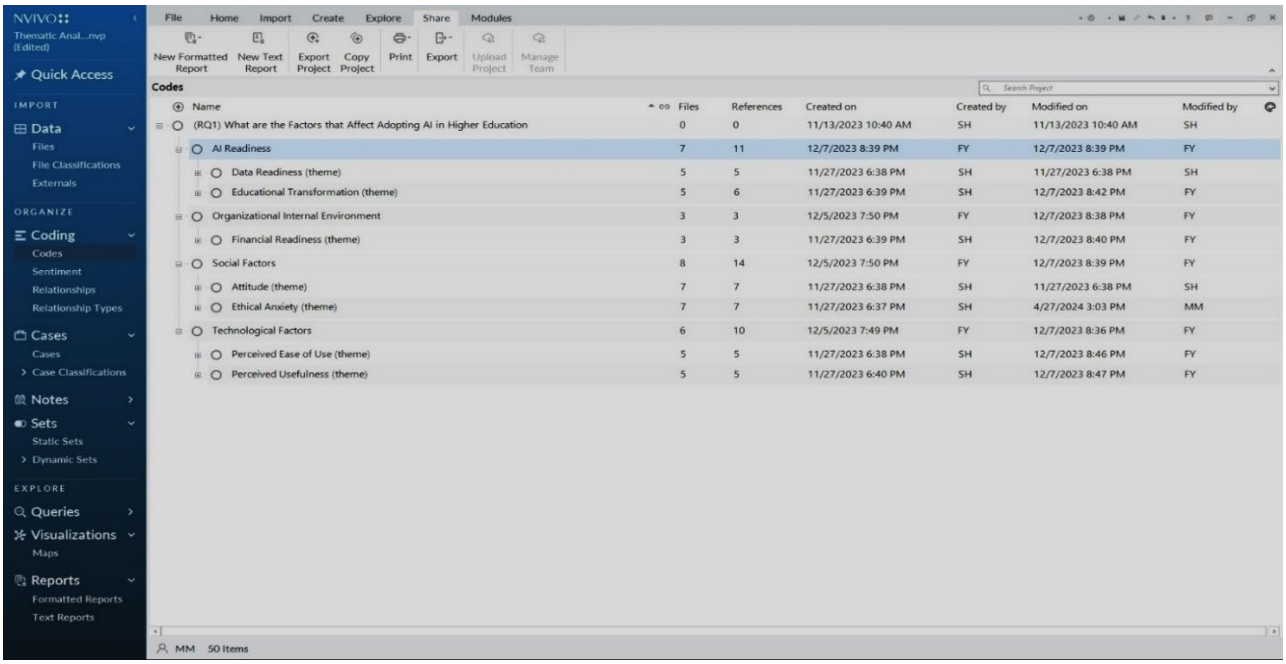

Figure 1. NVIVO Output

Organizational and internal environmental factors include financial readiness. Additionally, technological factors include perceived usefulness and Ease of use. Finally, the social factors include ethical anxiety. The relationships between the themes represent the propositions identified in the literature review. Based on TOE and TAM theory, the current study applies the proposed framework shown in Figure 2. This figure depicts the conceptual framework developed through interviews and literature studies. The conceptual framework has been modified in response to insights received from interviews. Notably, educational transformation, data readiness, and financial readiness were all included in the original conceptual framework. According to the theme analysis outcomes, educational transformation and data readiness fall into the category of AI readiness. Financial readiness is also viewed as an organizational and internal environmental issue. In addition, technological considerations include perceived usefulness and ease of use. The connections between the themes correspond to the statements raised in the literature review.

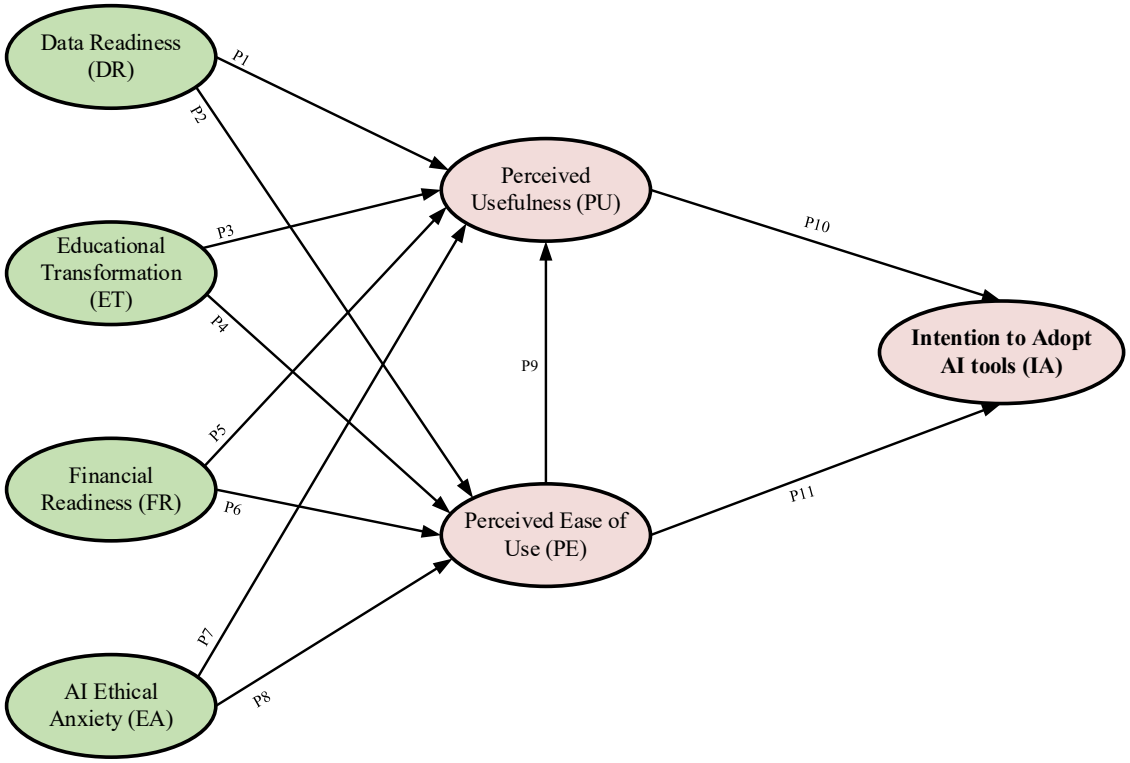

Figure 2. Conceptual Framework

5. Managerial Insights

In this study, a conceptual framework was developed by conducting semi-structured interviews in which new factors were introduced and explored within this study to explore their effect. This contribution helps to fill a gap in the research field. The factors DR, ET, and EA were the newly introduced factors obtained from the interviews, and their direct effect on PE and PU and indirect effect on PU were explored. Moreover, this study is amongst the first research studies in the Sultanate of Oman that studies specific and new factors in higher education. The qualitative tool was the semi-structured interviews with AI experts, and the data collected was analyzed using thematic analysis of NVIVO software. The knowledge of AI's perception among educational stakeholders will be enhanced using qualitative techniques like interviews (Grájeda et al. 2024).

Institutions must ensure they have high-quality, structured data to train and employ AI systems effectively (Banafa 2024). Being data-ready includes addressing privacy concerns and establishing protocols for data collection and handling. If data is not prepared correctly, AI algorithms could deliver biased or inaccurate results. Moreover, adopting AI in higher education requires adjustments to administrative and learning processes. This calls for integrating AI to enable customized learning and administrative efficiency. Educational institutions should employ change management strategies (Ahmad et al. 2023) and provide instructors and staff members with training to maximize AI's benefits. In addition, implementing AI technologies requires a significant financial investment in training, related infrastructure, and ongoing maintenance. Institutions need to assess their financial situation and allocate resources strategically (Madhumita et al. 2024). The ethical concerns around the use of AI, such as data privacy may create anxiety among stakeholders. Therefore, it is essential to set ethical guidelines, promote transparency in the use of AI (Balasubramaniam et al. 2023), and ensure that AI tools are designed to support human roles in education rather than replace them.

On the other hand, the adoption of AI tools in higher education is possible if the attitudes of the students are shaped to influence the intention to adopt AI tools, and that can be done by working on preparing the data, transforming the curriculum, educating the students about AI technologies, the benefits they offer and the potential impact on the different industries and raising awareness about the capabilities of AI tools, how to properly use them, and how they

can improve productivity and efficiency. Also, training the students and exposing them to real-life examples helps to change their behavior and intention towards the adoption of AI and that can be done by offering workshops and tutorials that involve the use of the various AI technologies and interactive demonstrations can help them immerse themselves into the world of artificial intelligence. Changing the perception of the students to perceive the AI tools as easy to use can also be done by training and familiarizing them with AI tools and how they work by offering step-by-step guidance and also by exposing them to AI tools with a user-friendly interface that is simple to navigate with low complexity and instructions to guide the users. Furthermore, highlighting the practical use of AI tools in solving real-life problems and the benefits obtained can help people's perception of how it is easy to use AI tools and also an illustration of how AI tools automate tasks, save time, and improve the decision making is helpful to persuade the students to adopt AI. In addition, it is recommended that policymakers offer a new introductory course (as a fundamental course) about applications of AI tools by concentrating on the social aspects, such as ethical issues and students' behavior when using AI tools in their studies.

6. Conclusion

This research identified key factors and challenges affecting AI adoption in Omani higher education, confirmed through literature and expert interviews, with some factors being notably more significant. Some factors and challenges were mentioned more frequently than others, highlighting the considerable effect of those specific factors and challenges. The top management of higher education institutions and the government should focus more on training and raising awareness of AI technologies to help change the behavior and perspective of the stakeholders and affect their intention to adopt AI tools. This study provides managerial insights and paves the way for the Omani government toward new horizons in the field of AI technologies, according to the vision of Oman 2040. Limitations included a shortage of experts which should be considered in interpreting the findings. As a foundation for further research, future work will utilize the TAM and TOE frameworks to assess institutions' intentions to adopt AI tools and develop strategies to address the identified challenges. Research endeavors should incorporate additional theoretical frameworks, such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and The Theory of Planned Behavior (TBP).

Acknowledgement

We would like to thank Sultan Qaboos University and the IR4 Committee for their support in conducting this study.

References

Afify, M. K., The impact of interaction between timing of feedback provision in distance E-learning and learning styles on achieving learning outcomes among Arab Open University Students. *Eurasia Journal of Mathematics, Science and Technology Education.* 2018.

Ahmad, A. M., Ibrahim K. and Ahmad, A., Managerial, organizational, and technological determinants of ICT adoption: Survey of academic staff in Bauchi State. *ATBU Journal of Science, Technology and Education,* vol. 5, no. 157-165, 2017.

Ahmad, S. F., Alam, M. M., Rahmat, M. K., Shahid, M. K., Aslam, M., Salim, N. A. and Al-Abyadh, M. H. A., Leading edge or bleeding edge: Designing a framework for the adoption of AI technology in an educational organization. *Sustainability,* vol. 15, no. 8, pp. 6540, 2023.

Alter, S., Work system theory as a platform: response to a research perspective article by Niederman and March, *Journal of the Association for Information Systems*, vol. 16, no. 6, pp. 483–514, 2015.

Alzahrani, A. M., Factors that influence secondary school teachers' acceptance of e-learning technologies in teaching in the Kingdom of Saudi Arabia. *Journal of Research in Curriculum Instruction and Educational Technology,* vol. 5, pp. 175-196., 2019.

Balasubramaniam, N., Kauppinen, M., Rannisto, A., Hiekkanen, K. and Kujala, S., Transparency and explainability of AI systems: from ethical guidelines to requirements. Information and Software Technology, vol. 159, pp. 107197, 2023.

Banafa, A., *Transformative AI: Responsible, Transparent, and Trustworthy AI Systems.* CRC Press, 2024.

Bansal, G. and Heath, D., Ten propositions on codepdence of AI and AI ethical framework adoption: view from industry and academia. *Journal of Information Technology Case and Application Research,* vol. 25, pp. 10–27. 2023.

Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R. and Verma, S., Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: an empirical investigation. *Annals of Operations Research*, vol. 333, pp. 627-652, 2024.

Bergstein, B., Can AI pass the smell test? *MIT Technology Review,* vol. 122, pp. 82–86, 2019.

Bhaskar, P. and Gupta, K., Inhibiting and motivating factors influencing teachers' adoption of AI-based teaching and learning solutions: Prioritization using analytic hierarchy process. *Journal of Information Technology Education: Research*, vol. 19, pp. 693–723, 2020.

Braun, V. and Clarke, V., Using thematic analysis in psychology. *Qualitative Research in Psychology,* vol. 3, no. 2, pp. 77-101, 2006.

Byrne, D., A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality and Quantity,* vol. 56, pp. 1391–1412, 2022.

Chan, C. K. Y., A comprehensive AI policy education framework for university teaching and learning. *International Journal of Educational Technology in Higher Education,* vol. 20, 2023.

Chen, M., Ebert, D., Hagen, H., Laramee, R.S., Van Liere, R., Ma, K.L., Ribarsky, W., Scheuermann, G. and Silver, D., Data, information, and knowledge in visualization, *IEEE Computer Graphics and Applications*, vol. 29, pp.12–19, 2009.

Chen, Y., Lin, Y., Yeh, R. and Lou, S., Examining factors affecting college students' intention to use web-based instruction systems: Towards an integrated model. *Turkish Online Journal of Educational Technology-TOJET,* vol. 12, no, 2, pp.111-121, 2013.

Chui, M. and Malhotra, S. AI adoption advances, but foundational barriers remain. Available: https://www.mckinsey.com/featured-insights/artificial-intelligence/ai-adoption-advances-but-foundational-barriers-remain, December 10, 2023.

Creswell, J. W. and Poth, C. N., Qualitative inquiry and research design: Choosing among five approaches. Sage publications, 2016.

Davis, F. D., Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly,* vol. 13, pp. 319-339, 1989.

Grájeda, A., Burgos, J., Córdova P. and Sanjinés, A., Assessing student-perceived impact of using artificial intelligence tools: Construction of a synthetic index of application in higher education, *Cogent Education, vol. 11*, pp. 2287917, 2024.

Gupta, S. and Bostrom, R. P., Technology-mediated learning: a comprehensive theoretical model. *Journal of the Association for Information Systems,* vol. 10, pp. 686–714, 2009

Harvey, G. and Hurworth, R., Exploring program sustainability: Identifying factors in two educational initiatives in Victoria. *Evaluation Journal of Australasia,* vol. 6, pp. 36-44, 2006.

Jobin, A., Ienca, M. and Vayena, E., The global landscape of AI ethics guidelines. *Nature Machine Intelligence,* vol. 1, pp. 389–399, 2019.

Kaya, F., Aydin, F., Schepman, A., Rodway, P., Yetişensoy, O. and Kaya, D. M., The roles of personality traits, AI anxiety, and demographic factors in attitudes toward Artificial Intelligence. *International Journal of Human-Computer Interaction,* vol. 40, no. 2, pp. 497-514, 2024.

Kim, H. W., Chan, H. C. and Gupta, S., Value-based adoption of mobile internet: An empirical investigation. *Decision Support Systems*, vol. 43, no. 1, pp. 111 –126, 2007.

Lakshmi, J. A., Kumar, A., Kumar, S. M., Patel, S. I., Naik, L. S. K. and Ramesh, J. V. N., Artificial intelligence in steering the digital transformation of collaborative technical education. *The Journal of High Technology Management Research,* vol. 34, no. 2, pp. 100467, 2023.

Lee, J., Davari, H., Singh, J. and Pandhare, V., Industrial artificial Intelligence for industry 4.0-based manufacturing systems. *Manufacturing Letters*, vol. 18, pp. 20–23, 2018.

Lin, F., Fofanah, S. S. and Liang, D., Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly,* vol. 28, pp. 271-279, 2011.

Madhumita, G., Dolly Diana, P., Neena, P.C., Narendra Kiran, P.G., Aggarwal, S. and Satish Nargunde, A., AI-powered performance management: Driving employee success and organizational growth, 2024 5th International Conference on Recent Trends in Computer Science and Technology (ICRTCST), Jamshedpur, India, pp. 204-209, 2024.

Merhi, M. I., An evaluation of the critical success factors impacting artificial intelligence implementation. *International Journal of Information Management,* vol. 69, pp. 102545, 2023.

Min, S. and Kim, B., Adopting artificial intelligence technology for network operations in digital transformation. *Administrative Sciences,* vol. 14, no. 4 pp.70, 2024.

Mohd Isa, P. and Ahmad, Y., Scrutinizing the issues and challenges faced by postgraduate students: An effort to design specific programs to inculcate research culture. *Journal of Administrative Science,* vol. *15*, pp. 1–17, 2018.

Morse, J. M., Designing funded qualitative research. In N.K. Denzin and Y.S. Lincoln (eds) Handbook of Qualitative Research (pp. 220-235). Thousand Oaks, CA: Sage, 1994.

Mustafa, A., The personalization of e-learning systems with the contrast of strategic knowledge and learner's learning preferences: An investigatory analysis, *Applied Computing and Informatics,* vol. 17, pp. 153-167, 2020.

Shippers, D. L., Revolutionizing with AI in SMEs: Internal and external innovators as drivers of change in SMEs. Department of Industrial Engineering & Innovation Sciences, Eindhoven University Technology, Master Thesis, 2023.

Tehrani, A. N., Ray, S., Roy, S. K., Gruner, R. L. and Appio, F. P., Decoding AI readiness: An in-depth analysis of key dimensions in multinational corporations, *Technovation,* vol. 131, pp. 102948, 2024.

UN [United Nations]. SDG 4. https://sdgs.un.org/goals/goal4, 2015.

Ungar, O. A. and Baruch, A. F., Perceptions of teacher educators regarding ICT implementation. *Interdisciplinary Journal of e-Skills and Lifelong Learning,* vol. 12, pp. 279-296, 2016.

Biographies

Shadhan Salim Al Harmi is an Industrial Engineering student at Sultan Qaboos University in Muscat, Oman. An accomplished student, he earned recognition as one of the top students in high school and showcased his linguistic talent by winning an English contest among various schools in Muscat during middle school. Recently, Shadhan was recognized on the honors list for the Spring 2024 semester, reflecting his dedication to academic excellence and the high regard of his instructors.

Mohamed Al Moqbali is a 2024 Industrial Engineering graduate from the Mechanical and Industrial Engineering Department at Sultan Qaboos University (SQU), Muscat, Sultanate of Oman.

Faisal Al Yafaey is a 2024 Industrial Engineering graduate from the Mechanical and Industrial Engineering Department at Sultan Qaboos University (SQU), Muscat, Sultanate of Oman.

Mohammed Othman is an Assistant Professor of Industrial Engineering at the Mechanical and Industrial Engineering Department of Sultan Qaboos University in the Sultanate of Oman, starting in 2023. He was an Assistant Professor at An-Najah National University, West Bank, Palestine, from 2013 to 2022. Dr Othman received a bachelor's degree in Industrial Engineering from An-Najah National University, Palestine 2002. Then, he received master's and PhD degrees in Industrial Engineering from Concordia University, Canada, in 2008 and 2012, respectively. His research interests include human factors, human resource management, production planning and scheduling, operations research, and logistics management. Mohammed Othman is the corresponding author and can be contacted at m.othman@squ.edu.om