ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

INTEGRATION OF TECHNOLOGY IN THE TEACHING AND LEARNING OF PHYSICS IN ZAMBIA: CHALLENGES, OPPORTUNITIES, AND STRATEGIC ALIGNMENT WITH THE 2023 CURRICULUM

Dr. J.Arockia Venice[1], Dr. Sumathi K. Sripathi[2], Ms. Nchimunya Changu Shichilaba[3]

[1,2,3]*DMI St. Eugene University, Zambia*

Abstract

This study investigates the integration of technology in the teaching and learning of physics in Zambia in line with the 2023 New Curriculum for Secondary Schools. Using a mixed-methods design, data were collected through questionnaires, interviews, and observations from physics teachers, students, and administrators. The study examines current practices, identifies challenges such as inadequate infrastructure, limited teacher training, and low digital literacy, and evaluates the opportunities presented by tools like mobile technologies, virtual labs, and open educational resources. The findings indicate a positive correlation between technology-enhanced teaching and improved student engagement and conceptual understanding. The paper concludes by proposing strategic interventions including professional development, policy revision, infrastructure investment, and curriculum reform to support sustainable and effective technology integration in physics education in Zambia.

Keywords

Physics Education, Technology Integration, Digital Learning Tools, 2023 Zambian Curriculum, Teacher Training, Virtual Laboratories, Science Pedagogy, Educational Innovation, Zambia.

1. Introduction

The 21st century has ushered in profound changes in the way knowledge is created, disseminated, and applied—particularly within science education. Physics, as a foundational subject in secondary school science curricula, is uniquely positioned to

https://doi.org/10.47059/AJMS/V4SI01/04

benefit from technological advancement in the classroom. Globally, the integration of technology in physics education has demonstrated positive outcomes, including enhanced conceptual understanding, improved student motivation, and more effective visualization of abstract phenomena (Kumar, 2022). In Zambia, this potential has been formally acknowledged through the 2023 New Curriculum, which emphasizes the use of digital tools to enhance teaching and learning across all subjects, including physics. Despite the curriculum's forward-looking vision, the practical implementation of technology in Zambian classrooms remains uneven. While some urban schools have adopted tools such as projectors, simulations, and educational apps, the majority of schools—particularly in peri-urban and rural areas—face systemic challenges that limit the use of technology. These include inadequate infrastructure, unreliable electricity, limited access to devices, and insufficient training for teachers. Additionally, many educators still rely on traditional chalk-and-talk methods, which are often insufficient for conveying the dynamic and conceptual nature of physics. Physics poses unique instructional challenges. Concepts such as electromagnetic induction, quantum phenomena, and vector motion are abstract and mathematically dense, making them difficult to grasp through lectures alone. In such contexts, technology can serve as a bridge between theory and practice, allowing students to experiment virtually, visualize invisible forces, and manipulate variables in simulations that would be impossible or unsafe in real laboratories. However, these advantages can only be realized when schools have the capacity, resources, and training to integrate these tools meaningfully into pedagogy. This study explores the current state of technology integration in the teaching and learning of physics in selected Zambian secondary schools. It investigates both the challenges and opportunities faced by educators and learners, with an emphasis on aligning classroom practices with the goals of the 2023 New Curriculum. By examining the experiences of teachers, students, and administrators, the study aims to generate insights that can guide policy makers, curriculum developers, and teacher education institutions toward scalable and sustainable improvements in physics education.

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

2. Research Objectives and Questions

The overarching goal of this study is to evaluate the integration of technology in physics education in Zambia, particularly in the context of the revised 2023 Secondary School Curriculum. The research seeks to understand how digital tools are currently used in classrooms, identify barriers to their effective implementation, and explore the opportunities they present for enhancing student learning outcomes in physics.

2.1 Research Objectives

- To assess the current practices of integrating technology into the teaching and learning of physics in selected secondary schools in Zambia.
- To identify the challenges faced by teachers, students, and administrators in implementing technology-enhanced physics instruction.
- To evaluate the opportunities and potential benefits offered by tools such as simulations, virtual laboratories, and mobile learning platforms in improving conceptual understanding in physics.
- To explore the alignment between the goals of the 2023 Zambian Secondary School Curriculum and the actual technological practices in physics classrooms.
- To recommend strategic interventions for promoting effective and sustainable use of technology in physics education across diverse school settings.

2.2 Research Questions

- What digital tools and technological resources are currently used in the teaching and learning of physics in Zambian secondary schools?
- What are the main institutional, pedagogical, and technical challenges hindering the integration of technology in physics education?
- How do teachers and students perceive the effectiveness of technology in improving physics understanding and classroom engagement?
- To what extent is the 2023 Curriculum's emphasis on technology integration reflected in everyday classroom practice?

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

- What strategic measures can be adopted to enhance the use of technology in the physics education ecosystem in Zambia?

3. Methodology

This study adopted a mixed-methods research design, combining both quantitative and qualitative approaches to provide a comprehensive understanding of how technology is integrated into the teaching and learning of physics in Zambia. This methodological framework allowed for triangulation of data, ensuring that the results were both statistically valid and contextually rich.

3.1 Research Setting and Participants

The study was conducted in six government and grant-aided secondary schools in Zambia's Lusaka and Central Provinces, reflecting a mix of urban and peri-urban educational settings. Participants included 12 physics teachers, 3 head teachers or curriculum coordinators, and 180 students enrolled in Grades 10 to 12. The schools were selected based on accessibility, variation in technological infrastructure, and participation in recent curriculum implementation training related to the 2023 reform.

3.2 Sampling Technique

A combination of purposive and stratified sampling was employed. Teachers were selected based on their subject specialization and experience in using educational technology. Students were stratified by grade level to ensure balanced representation across the secondary school continuum. Head teachers were included to provide institutional perspectives on infrastructure, policy implementation, and leadership support for technology integration.

3.3 Data Collection Tools

Questionnaires were administered to students and teachers to gather quantitative data on access to digital tools, frequency of use, and perceived impact on learning. Semi-structured interviews with teachers and administrators explored deeper issues such as

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

training needs, curriculum alignment, and infrastructural support. Classroom observations provided insight into actual teaching practices, including how and when technology was used, student engagement levels, and integration with curriculum objectives. Document review of lesson plans, school improvement plans, and curriculum guides helped contextualize findings within institutional frameworks.

3.4 Data Analysis

Quantitative data from the questionnaires were analyzed using descriptive statistics (means, frequencies, standard deviations), while inferential analysis was employed where appropriate to identify correlations between access to technology and learning outcomes. Qualitative data from interviews and observations were transcribed and analyzed using thematic coding, focusing on key categories such as barriers to integration, opportunities for innovation, teacher preparedness, and institutional support. This methodological approach enabled the researchers to build a multi-perspective understanding of how technology is being integrated—or not—into the teaching and learning of physics, and to generate evidence-based recommendations for future policy and practice.

4. Results and Discussion

The findings from this study reveal a mixed picture of technology integration in physics education across the selected Zambian secondary schools. While there is growing awareness among educators of the benefits of educational technology, actual classroom implementation remains limited and uneven due to infrastructural, pedagogical, and policy-related challenges. The discussion is organized into key thematic areas derived from the data.

4.1 Technology Usage in Physics Classrooms

Across the six schools studied, only a minority of physics teachers reported consistent use of technology in instruction. Tools cited included projectors, smartphones, simulation software (such as PhET), and YouTube videos. Teachers who had undergone training workshops related to the 2023 curriculum were more likely to experiment with these

https://doi.org/10.47059/AJMS/V4SI01/04

tools, using them to demonstrate complex physics concepts like projectile motion, refraction, and electricity. However, over 60% of teachers acknowledged that technology use was sporadic, primarily due to limited access to devices and internet connectivity. In schools where functional computer labs existed, they were often shared with other departments or repurposed for administrative functions, thereby reducing their availability for regular science instruction.

4.2 Student Engagement and Learning Outcomes

Students in technology-enabled classrooms reported higher levels of interest and understanding, particularly in topics that are abstract or involve motion and forces. The use of animated simulations and virtual labs helped demystify concepts that are difficult to reproduce in physical settings due to safety or cost concerns. For example, in one observed lesson on electromagnetic induction, students who watched a simulation showing field line movement and induced current performed significantly better on a follow-up conceptual quiz than peers in traditional lecture-based settings. These findings suggest a positive correlation between digital content usage and conceptual clarity, particularly for visual and kinesthetic learners.

4.3 Barriers to Effective Integration

Despite these benefits, several critical challenges hindered the consistent integration of technology: Inadequate Infrastructure: Many classrooms lacked basic necessities such as electricity, secure storage for devices, or stable internet connections. In some rural schools, even the most basic ICT tools were absent.

Limited Teacher Training: Most teachers had not received formal instruction on how to integrate technology into their physics lessons. Those who did reported that the training was brief, theoretical, and not tailored to subject-specific needs.

Overcrowded Classrooms: Large student-to-teacher ratios made it difficult to facilitate interactive, tech-based lessons. Teachers found it challenging to ensure equal access to devices or manage classroom behavior during digital activities.

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

Curricular Misalignment: Some teachers felt that the national exams still prioritized theoretical recall over practical or technology-based learning, which discouraged experimentation with digital tools.

4.4 Alignment with the 2023 Curriculum

The 2023 Zambian Secondary School Curriculum explicitly promotes the use of ICT and digital literacy in all subjects, with physics singled out as a priority area for simulation and visualization. However, the gap between curriculum policy and classroom practice remains wide. While head teachers were generally aware of the policy directives, most schools lacked implementation roadmaps, support structures, or dedicated budgets for technology integration in science. Teachers reported feeling enthusiastic about the curriculum's vision but constrained by lack of training, peer support, and administrative flexibility. Without coordinated support and systemic investment, the curriculum's goals risk remaining aspirational rather than transformational.

5. Challenges and Opportunities

The integration of technology into physics education in Zambia presents a landscape shaped by both persistent barriers and promising possibilities. While the 2023 curriculum encourages digital innovation in teaching, systemic challenges continue to impede full implementation. This section outlines the key challenges and opportunities identified through the study.

5.1 Challenges

a. Infrastructure Deficits

Many schools lack the basic infrastructure required for sustained technology integration. Unreliable electricity, insufficient computer labs, poor internet connectivity, and absence of secure storage for devices were frequently cited as deterrents. Teachers also expressed

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

concern about the risk of theft or vandalism of ICT equipment in under-resourced environments.

b. Inadequate Professional Development

A significant number of teachers indicated that they had not received adequate training on integrating digital tools into physics instruction. Those who had attended CPD workshops often found them to be overly general, lacking subject-specific strategies. As a result, even where technology is available, it is not always used effectively or confidently.

c. Digital Literacy Gaps

Both students and teachers in peri-urban and rural schools demonstrated low levels of digital literacy, limiting their ability to engage meaningfully with available tools. Some students lacked personal experience with computers or tablets and found basic navigation of software or simulations challenging.

d. Time Constraints and Syllabus Pressure

Teachers reported that the pressure to complete the syllabus for national exams leaves little room for experimentation with new teaching methods. The additional time required to prepare and facilitate tech-based lessons is often perceived as impractical in an already packed academic calendar.

e. Policy-Implementation Mismatch

While the 2023 curriculum outlines ambitious goals for digital integration, many schools have not received corresponding support, such as updated teaching guides, ICT resource kits, or implementation timelines. This disconnect results in inconsistent and fragmented efforts.

5.2 Opportunities

a. High Student Receptivity

Students across all schools showed enthusiasm for digital learning tools. Many expressed a desire for more frequent use of simulations, videos, and mobile-based applications. This intrinsic motivation is a valuable asset that educators and policymakers can leverage.

b. Mobile Technology Penetration

https://doi.org/10.47059/AJMS/V4SI01/04

Despite infrastructure limitations, mobile phones are increasingly accessible to students and teachers. Several educators reported success using WhatsApp groups to share video clips, assignments, and links to physics simulations. This indicates that mobile learning could be a scalable interim solution for bridging the resource gap.

c. Availability of Open Educational Resources (OER)

Teachers who used platforms such as PhET, Khan Academy, and YouTube found them effective in illustrating complex concepts. These freely available tools can supplement instruction and reduce reliance on expensive proprietary software.

d. Supportive Curriculum Policy

The 2023 curriculum provides a policy window that legitimizes experimentation and integration of technology in science education. This framework, if operationalized with clear funding and support mechanisms, can catalyze large-scale change.

e. Potential for Public-Private Partnerships

There is growing interest among NGOs, tech firms, and development partners in supporting education through digital platforms. Collaborative initiatives could provide hardware donations, training programs, or locally developed educational content.

6. Recommendations

To ensure the effective and sustainable integration of technology in the teaching and learning of physics in Zambia, the following strategic interventions are recommended. These are informed by the study's findings and aligned with the goals of the 2023 Zambian Curriculum.

6.1 Invest in Subject-Specific Professional Development

The Ministry of Education and teacher training institutions should design and implement specialized CPD programs focused on integrating technology in science and physics instruction. These should be hands-on, context-sensitive, and aligned with the Zambian curriculum. Teachers should be trained not just in ICT use, but in pedagogical strategies that maximize student learning with technology.

https://doi.org/10.47059/AJMS/V4SI01/04

6.2 Strengthen Digital Infrastructure in Schools

Government, donors, and private sector partners should collaborate to improve digital infrastructure, especially in underserved areas. This includes the provision of solar-powered ICT labs, reliable internet connectivity, and secure storage for devices. Even modest infrastructure improvements—such as mobile projectors and Wi-Fi hotspots—can have a major impact.

6.3 Promote the Use of Mobile and Offline Technologies

Given the widespread ownership of mobile phones, the Ministry of Education should encourage the use of mobile-based learning tools, including offline physics apps, audio-visual lessons, and SMS-based content delivery systems. Partnerships with developers can produce affordable, curriculum-aligned applications that support both students and teachers in low-connectivity areas.

6.4 Develop and Distribute Localized Digital Content

Locally relevant and curriculum-aligned digital physics content should be created in collaboration with Zambian teachers and subject experts. This may include simulations in local languages, virtual lab activities tailored to the Zambian context, and interactive assessments. Open licensing models should be used to ensure broad accessibility.

6.5 Embed Digital Assessment in National Exams

To reinforce the integration of technology, the Examinations Council of Zambia (ECZ) should begin incorporating digital competencies and simulation-based questions into science assessments. This will incentivize both teachers and schools to align instruction with tech-based practices.

6.6 Foster Communities of Practice and Peer Mentoring

Schools should be encouraged to establish Digital Learning Committees or Communities of Practice (CoPs) where teachers can share experiences, tools, and lesson plans. Experienced teachers can mentor colleagues through model lessons and peer observation.

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

6.7 Monitor, Evaluate, and Adapt Implementation

Ongoing monitoring and evaluation mechanisms must be established to track the effectiveness of technology integration. School-level ICT audits, student performance analytics, and teacher feedback loops should be used to refine policies and inform targeted support.

6.8 Leverage Public–Private Partnerships

The Ministry of Education should actively seek partnerships with technology companies, telecom providers, NGOs, and universities to fund hardware donations, teacher training, content development, and infrastructure rollouts. Incentivized collaborations could lead to scalable, low-cost innovations in science education delivery. These recommendations collectively aim to bridge the gap between policy and practice, ensuring that the transformative potential of technology in physics education is realized not only in vision but also in classrooms across Zambia.

7. Conclusion

The integration of technology in the teaching and learning of physics represents a transformative opportunity for Zambian education. Aligned with the goals of the 2023 New Curriculum, digital tools offer a pathway to deepen conceptual understanding, enhance student engagement, and modernize science instruction to meet global standards. This study has demonstrated that, when effectively implemented, technology enriches the learning environment by making abstract physics phenomena more tangible, interactive, and accessible. However, the current state of implementation reveals a stark disparity between curricular vision and classroom reality. Many schools lack the basic infrastructure, training, and policy support required for meaningful technology use. Teachers are enthusiastic yet underprepared, and students are eager yet under-resourced. The challenges—ranging from digital illiteracy to infrastructural limitations—underscore the need for a systemic, well-coordinated response that addresses both pedagogical capacity and technological access. At the same time, promising signs abound. Student

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

receptiveness to digital tools, teacher willingness to innovate, and the increasing availability of open educational resources present a fertile ground for scalable intervention. With strategic investment in teacher training, infrastructure development, mobile technology, and localized digital content, Zambia can bridge the gap and create physics classrooms that are not only aligned with the national curriculum but are also globally competitive. To succeed, the shift must be collective: led by policy makers, supported by institutions, enabled by partnerships, and driven by the commitment of teachers and learners. By embracing these changes, Zambia can empower its youth with the scientific skills, digital fluency, and critical thinking needed for success in an increasingly technological world.

8. References

1. Akila, V., M., R. E., Prabhu, G., Akila, R., & Swadhi, R. (2025). Performance Metrics in Blockchain-Enabled AIML for Cognitive IoT in Large-Scale Networks: Optimizing Data Analytics for Enhanced Network Performance. In R. Kanthavel & R. Dhaya (Eds.), AI for Large Scale Communication Networks (pp. 265-288). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6552-6.ch012
2. Arockia Venice, J., Arivazhagan, D., Suman, N., Shanthi, H. J., & Swadhi, R. (2025). Recommendation Systems and Content Personalization: Algorithms, Applications, and Adaptive Learning. In R. Kanthavel & R. Dhaya (Eds.), AI for Large Scale Communication Networks (pp. 323-348). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6552-6.ch015
3. Arockia Venice, J., Vettriselvan, R., Rajesh, D., Xavier, P., & Shanthi, H. J. (2025). Optimizing Performance Metrics in Blockchain-Enabled AI/ML Data Analytics: Assessing Cognitive IoT. In S. Hai-Jew (Ed.), Enhancing Automated Decision-Making Through AI (pp. 97-122). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6230-3.ch004
4. Arockia, V. J., Vettriselvan, R., Rajesh, D., Velmurugan, P. R., & Cheelo, C. (2025). Leveraging AI and Learning Analytics for Enhanced Distance Learning: Transformation in Education. In H. Mamede & A. Santos (Eds.), AI and Learning

https://doi.org/10.47059/AJMS/V4SI01/04

Analytics in Distance Learning (pp. 179-206). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7195-4.ch008

5. Bansod, A., & Venice, A. (2023). Importance of Cybersecurity and RegTech in FinTech. Telecom Business Review, 16(1).
6. Basha, R., Pathak, P., Sudha, M., Soumya, K. V., & Arockia Venice, J. (2025). Optimization of Quantum Dilated Convolutional Neural Networks: Image Recognition With Quantum Computing. Internet Technology Letters, 8(3), e70027.
7. Catherin, T. C., Vettriselvan, R., Mathur, S., Regins, J. C., & Velmurugan, P. R. (2025). Integrating AI and Learning Analytics in Distance Learning: Strategies for Educators and Institutions. In H. Mamede & A. Santos (Eds.), AI and Learning Analytics in Distance Learning (pp. 207-228). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7195-4.ch009
8. Delecta Jenifer, R., Vettriselvan, R., Saxena, D., Velmurugan, P. R., & Balakrishnan, A. (2025). Green Marketing in Healthcare Advertising: A Global Perspective. In B. Miguélez-Juan & S. Rebollo-Bueno (Eds.), AI Impacts on Branded Entertainment and Advertising (pp. 303-326). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-3799-8.ch015
9. Devi, M., Manokaran, D., Sehgal, R. K., Shariff, S. A., & Vettriselvan, R. (2025). Precision Medicine, Personalized Treatment, and Network-Driven Innovations: Transforming Healthcare With AI. In R. Kanthavel & R. Dhaya (Eds.), AI for Large Scale Communication Networks (pp. 303-322). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6552-6.ch014
10. Duraimutharasan, N., Deepan, A., Swadhi, R., Velmurugan, P. R., & Varshney, K. R. (2025). Enhancing Control Engineering Through Human-Machine Collaboration: AI for Improved Efficiency and Decision-Making. In M. Mellal (Ed.), Harnessing AI for Control Engineering (pp. 155-176). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7812-0.ch008
11. Gayathri, K., Krishnan, P., Rajesh, K., Anandan, K., & Swadhi, R. (2019). Synthesis, growth, structural, optical, thermal, dielectric and laser damage threshold studies of

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

new semi organic NLO crystal: Tetra aqua bis (hydrogen maleato) cobalt(II). AIP Conference Proceedings, 2115, 030412. https://doi.org/10.1063/1.5113251.

12. Gayathri, K., Rajesh, K., Krishnan, P., Anandan, K., Swadhi, R., Devaraj, A. R., & Anbalagan, G. (2020). Structural and optical properties of SnO_2 thin films deposited by spray pyrolysis technique. AIP Conference Proceedings, 2265, 030425. https://doi.org/10.1063/5.0017481
13. Geethapriya, J. & Devaraj, Anitha & Krishnan, Gayathri & Swadhi, R. & Elangovan, N & S.Manivel, & Subbaiah, Sowrirajan & Thomas, Renjith. (2023). Solid state synthesis of a fluorescent Schiff base (E)-1-(perfluorophenyl)-N-(o-toly)methanimine followed by computational, quantum mechanical and molecular docking studies. Results in Chemistry. 5. 100819. 10.1016/j.rechem.2023.100819.
14. J. Jayaganesh, K. Suresh Kumar, Konda Hari Krishna, Mohit Tiwari, R. Vettriselvan, Chetan Shelke, (2026) Different Requirements in Quality of Service Using an Adaptive Network Algorithm, Advances in AI for Cloud, Edge, and Mobile Computing Applications, Apple Academic Press, Taylor & Francis Group.
15. Manoharan, C., Poongavanam, S., Arivazhagan, D., Divyaranjani, R., & Vettriselvan, R. (2020). Cognition and emotions during teaching-learning process. International Journal of Scientific and Technology Research, 9(2), 267-269.
16. Natraj, N. A., Abirami, T., Ananthi, K., Venice, J. A., Chandru, R., & Rathish, C. R. (2024). The Impact of 5G Technology on the Digital Supply Chain and Operations Management Landscape. In Applications of New Technology in Operations and Supply Chain Management (pp. 289-311). IGI Global.
17. Natraj, N. A., Abirami, T., Ananthi, K., Venice, J. A., Chandru, R., & Rathish, C. R. (2024). The Impact of 5G Technology on the Digital Supply Chain and Operations Management Landscape. In Applications of New Technology in Operations and Supply Chain Management (pp. 289-311). IGI Global.
18. R. Vettriselvan, C. Vijai, J. D. Patel, S. Kumar.R, P. Sharma and N. Kumar, "Blockchain Embraces Supply Chain Optimization by Enhancing Transparency and Traceability from Production to Delivery," 2024 International Conference on Trends in Quantum Computing and Emerging Business T

https://doi.org/10.47059/AJMS/V4SI01/04

19. Ramya, R., Kiruthiga, V., Vettriselvan, R., Gayathri, V., & Velmurugan, P. R. (2025). Hybrid Entrepreneurship Navigating Career Transitions: Career Shifts and Their Impact on Economic Growth. In M. Tunio (Ed.), Applications of Career Transitions and Entrepreneurship (pp. 241-268). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-4163-6.ch010
20. Shanthi, H. J., Gokulakrishnan, A., Sharma, S., Deepika, R., & Swadhi, R. (2025). Leveraging Artificial Intelligence for Enhancing Urban Health: Applications, Challenges, and Innovations. In F. Özsungur (Ed.), Nexus of AI, Climatology, and Urbanism for Smart Cities (pp. 275-306). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-5918-1.ch010
21. Sujatha, R., Aarthy, S. L., & Vettriselvan, R. (Eds.). (2021). Integrating Deep Learning Algorithms to Overcome Challenges in Big Data Analytics. CRC Press.
22. Swadhi, R. (2025). Innovative Strategies for Widespread Adoption in a Climate-Smart Future: Scaling Up Agroforestry. In A. Atapattu (Ed.), Agroforestry for a Climate-Smart Future (pp. 473-496). IGI Global Scientific Publishing.
23. Swadhi, R., Gayathri, K., Anitha Rexalin, D., Rajesh, K., & Anandan, K. (2025). Development and characterization of gadolinium-doped hydroxyapatite to enhance biocompatibility in biomedical applications. Texila International Journal of Public Health, 13(1). https://doi.org/10.21522/tijph.2013.13.01.art033
24. Swadhi, R., Gayathri, K., Anitha Rexalin, D., Rajesh, K., & Anandan, K. (2025). Magnesium-doped brucinium hydroxyapatite: A versatile material for biomedical applications. Cuestiones de Fisioterapia, 54(4), 288–298
25. Swadhi, R., Gayathri, K., Dimri, S., Balakrishnan, A., & Jyothi, P. (2025). Role of Digital Marketing in Shaping Travel Decisions: Consumer Behavior in Tourism. In B. Sousa & V. Santos (Eds.), Intersections of Niche Tourism and Marketing (pp. 153-176). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-8417-6.ch007https://doi.org/10.4018/979-8-3693-8282-0.ch016
26. Swadhi, R., Gayathri, K., Rajesh, K., Anandan, K. & Anitha Rexalin, D., (2023). Hydrothermal synthesis and characterization of brucine functionalized

https://doi.org/10.47059/AJMS/V4SI01/04

hydroxyapatite materials for bioimaging applications. European Chemical Bulletin, 12(7), 2456–2469. https://doi.org/10.48047/ecb/2023.12.7.190

27. Thiruvasagam, G., & Vettriselvan, R. (2021). What is after COVID-19?: Changing economies of the shipping industries and maritime education institutions. 21st Annual General Assembly, IAMU AGA 2021-Proceedings of the International Association of Maritime Universities, 96-110.
28. Velmurugan, P. R., Arunkumar, S., Vettriselvan, R., Deepan, A., & Rajesh, D. (2025). Strategic Approaches to Corporate Social Responsibility and Sustainable Development: Integrating Leadership, Marketing, and Finance. In I. Gigauri & A. Khan (Eds.), Navigating Corporate Social Responsibility Through Leadership and Sustainable Entrepreneurship (pp. 373-406). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6685-1.ch013
29. Velmurugan, P. R., Catherine, S., Vettriselvan, R., E. P., J., & Rajesh, D. (2025). Innovative Intercultural Communication Training in Translator Education: Cultivating Cultural Competence. In M. Amini (Ed.), Cutting-Edge Approaches in Translator Education and Pedagogy (pp. 217-244). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6463-5.ch008
30. Velmurugan, P. R., Swadhi, R., Varshney, K. R., Regins, J. C., & Gayathri, K. (2025). Creating Engaging and Personalized Learning Experiences in Distance Education: AI and Learning Analytics. In H. Mamede & A. Santos (Eds.), AI and Learning Analytics in Distance Learning (pp. 103-126). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7195-4.ch005
31. Venice, J. A., Thoti, K. K., Henrietta, H. M., Elangovan, M., Anusha, D. J., & Zhakupova, A. (2022, September). Intelligent space robots integrated with enhanced information technology and development activities. In 2022 4th international conference on inventive research in computing applications (ICIRCA) (pp. 241-249). IEEE.
32. Venice, J. A., Thoti, K. K., Henrietta, H. M., Elangovan, M., Anusha, D. J., & Zhakupova, A. (2022, November). Artificial Intelligence based Robotic System with

https://doi.org/10.47059/AJMS/V4SI01/04

Enhanced Information Technology. In 2022 Sixth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC) (pp. 705-714). IEEE.

33. Vettriselvan, R. & Ramya, R. (2025). Sustainable Curriculum Design and Development: A Comprehensive Approach. In A. Sorayyaei Azar, S. Gupta, K. Al Bataineh, N. Maurya, & P. Somani (Eds.), Smart Education and Sustainable Learning Environments in Smart Cities (pp. 471-486). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7723-9.ch027
34. Vettriselvan, R. (2025). Commercial Applications of Aeroponics: Revolutionizing Modern Agriculture and Sustainable Food Production. In C. G. (Ed.), Utilizing Aeroponics Techniques for Improved Farming (pp. 249-282). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-2320-5.ch010
35. Vettriselvan, R. (2025). Empowering Digital Education: The Future of Value-Based Learning in the Digital Era. In B. Sousa & C. Veloso (Eds.), Empowering Value Co-Creation in the Digital Era (pp. 199-228). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3373-1742-7.ch009
36. Vettriselvan, R. (2025). Harnessing Innovation and Digital Marketing in the Era of Industry 5.0: Resilient Healthcare SMEs. In T. Olubiyi, S. Suppiah, & C. Chidoko (Eds.), The Future of Small Business in Industry 5.0 (pp. 163-186). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7362-0.ch007
37. Vettriselvan, R., & Anto, M. R. (2018). Pathetic health status and working condition of Zambian women. Indian Journal of Public Health Research & Development, 9(9), 259-264.
38. Vettriselvan, R., Anu, S., & Jesu Rajan, F. S. A. (2016). Problems faced by women Construction workers in Theni District. International Journal of Management Research and Social Science, 3(2), 58-61.
39. Vettriselvan, R., Deepa, R., Gautam, R., Suresh, N. V., & Cathrine, S. (2025). Bridging Academia and Industry Through Technology and Entrepreneurial Innovation: Enhancing Supply Chain Efficiency. In P. Mahalle (Ed.), Bridging Academia and Industry Through Cloud Integration in Education (pp. 145-174). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6705-6.ch006

https://doi.org/10.47059/AJMS/V4SI01/04

ASET JOURNAL OF MANAGEMENT SCIENCE
Peer Reviewed & Open Access Journal
ISSN : 2584 - 220X (Online) | RNI : Applied | Frequency : Bi-Monthly

40. Vettriselvan, R., Deepan, A., Garg, P. K., Suresh, N. V., & Velmurugan, P. R. (2025). Advanced Text Analysis, Simplification, Classification, and Synthesis Techniques: Leveraging AI for Enhanced Medical Education. In N. Jomaa (Ed.), Using AI Tools in Text Analysis, Simplification, Classification, and Synthesis (pp. 37-66). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-9511-0.ch002
41. Vettriselvan, R., Deepan, A., Jaiswani, G., Balakrishnan, A., & Sakthivel, R. (2025). Health Consequences of Early Marriage: Examining Morbidity and Long-Term Wellbeing. In E. Uddin (Ed.), Social, Political, and Health Implications of Early Marriage (pp. 189-212). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-3394-5.ch008
42. Vettriselvan, R., Rajesh, D., Subhashini, S., Gajalakshmi, K., & Sakthivel, R. (2025). Developing and Applying PCK in Diverse Subjects: Best Practices for Mathematics, Science, Social Sciences, and Language Arts. In N. Taskin Bedizel (Ed.), Current Trends and Best Practices of Pedagogical Content Knowledge (PCK) (pp. 1-30). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-0655-0.ch001
43. Vettriselvan, R., Rajesh, D., Swadhi, R., Velmurugan, P. R., & Arunkumar, S. (2025). Enhancing Efficiency and Accountability: Innovative Approaches to Public Financial Management in Higher Education. In A. Enaifoghe & R. Mthethwa (Eds.), Challenges of Public Administration Management for Higher Education (pp. 81-112). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-4346-3.ch005
44. Vettriselvan, R., Ramya, R., Sathya, M., Swadhi, R., & Deepan, A. (2025). Service Delivery and Citizen-Centric Approaches: Innovating Public Administration Management in Higher Education. In A. Enaifoghe & R. Mthethwa (Eds.), Challenges of Public Administration Management for Higher Education (pp. 113-136). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-4346-3.ch006
45. Vettriselvan, R., Velmurugan, P. R., Deepan, A., Jaiswani, G., & Durgarani, M. (2025). Transforming Virtual Education: Advanced Strategies for Quality Assurance

https://doi.org/10.47059/AJMS/V4SI01/04

in Online and Distance Learning. In M. Kayyali (Ed.), Navigating Quality Assurance and Accreditation in Global Higher Education (pp. 563-580). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6915-9.ch024

46. Vettriselvan, R., Velmurugan, P. R., Regins, J. C., Uma Maheswari, S., & Joyce, R. (2025). Best Practices, Ethical Challenges, and Regulatory Frameworks for AI Integration in Banking: Navigating the Future. In P. Chelliah, R. Venkatesh, N. Natraj, & R. Jeyaraj (Eds.), Artificial Intelligence for Cloud-Native Software Engineering (pp. 377-410). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-9356-7.ch015
47. Vettriselvan, R., Velmurugan, P. R., Varshney, K. R., E. P., J., & Deepika, R. (2025). Health Impacts of Smartphone and Internet Addictions Across Age Groups: Physical and Mental Health Across Generations. In M. Anshari, M. Almunawar, & P. Ordóñez de Pablos (Eds.), Impacts of Digital Technologies Across Generations (pp. 187-210). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6366-9.ch010
48. Vettriselvan, R., Vijai, C., Patel, J. D., Sharma, P., & Kumar, N. (2024, March). Blockchain embraces supply chain optimization by enhancing transparency and traceability from production to delivery. In 2024 International Conference on Trends in Quantum Computing and Emerging Business Technologies (pp. 1-6). IEEE.
49. Vijayalakshmi, M., A. K., S., Vettriselvan, R., Velmurugan, P. R., & Hasine, J. (2025). Strategic Collaborations in Medical Innovation and AI-Driven Globalization: Advancing Healthcare Startups. In V. Gupta & C. Gupta (Eds.), Navigating Strategic Partnerships for Sustainable Startup Growth (pp. 85-110). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-4066-0.ch004
50. Vijayalakshmi, M., Subramani, A. K., Vettriselvan, R., Catherin, T. C., & Deepika, R. (2025). Sustainability and Responsibility in the Digital Era: Leveraging Green Marketing in Healthcare. In H. Rahman (Ed.), Digital Citizenship and Building a Responsible Online Presence (pp. 285-306). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6675-2.ch011

51. Suresh, N. V., & Rexy, V. A. M. (2024, February). An Empirical Study on Empowering Women through Self Help Groups. In 3rd International Conference on Reinventing Business Practices, Start-ups and Sustainability (ICRBSS 2023) (pp. 957-964). Atlantis Press.

52. Suganya, V., & Suresh, N. V. (2024). Potential Mental and Physical Health Impacts of Spending Extended Periods in the Metaverse: An Analysis. In Creator's Economy in Metaverse Platforms: Empowering Stakeholders Through Omnichannel Approach (pp. 225-232). IGI Global.

53. Catherine, S., Kiruthiga, V., & Gabriel, R. (2024). Effective Brand Building in Metaverse Platform: Consumer-Based Brand Equity in a Virtual World (CBBE). In Omnichannel Approach to Co-Creating Customer Experiences Through Metaverse Platforms (pp. 39-48). IGI Global Scientific Publishing.

54. Suresh, N. V., Manoj, G., Rajkumar, M. D., & Kanagasabai, B. (2024). Fundamental anomalies as a mediator in the relationship between heuristics and investment decisions. International Journal of Applied Management Science, 16(4), 383-396.

55. Suresh, N. V., Selvakumar, A., Sasikala, B., & Sridhar, G. (2024, June). Integrating Environmental, Social, and Governance (ESG) Factors into Social Accounting Frameworks: Implications for Sustainable Business Practices. In International Conference on Digital Transformation in Business: Navigating the New Frontiers Beyond Boundaries (DTBNNF 2024) (pp. 18-28). Atlantis Press.

56. Poongavanam, S., Srinivasan, R., Arivazhagan, D., & Suresh, N. V. (2023). Medical Inflation-Issues and Impact. Chettinad Health City Medical Journal (E-2278-2044 & P-2277-8845), 12(2), 122-124.

https://doi.org/10.47059/AJMS/V4SI01/04

57. Suresh, N. V., Selvakumar, A., & Sridhar, G. (2024). Operational efficiency and cost reduction: the role of AI in healthcare administration. In Revolutionizing the Healthcare Sector with AI (pp. 262-272). IGI Global.

58. Suresh, N. V., Selvakumar, A., Sridhar, G., & Jain, V. (2024). Integrating Mechatronics in Autonomous Agricultural Machinery: A Case Study. Computational Intelligent Techniques in Mechatronics, 491-507.

59. Suresh, N. V., Ananth Selvakumar, Gajalaksmi Sridhar, and S. Catherine. "Ethical Considerations in AI Implementation for Patient Data Security and Privacy." In AI Healthcare Applications and Security, Ethical, and Legal Considerations, pp. 139-147. IGI Global, 2024.

60. Catherine, S., Ramasundaram, G., Nimmagadda, M. R., & Suresh, N. V. (2025). Roots, Routes, and Identity: How Culture Shapes Heritage Travel. In Multiple-Criteria Decision-Making (MCDM) Techniques and Statistics in Marketing (pp. 343-352). IGI Global Scientific Publishing.

61. Suresh, N. V., Selvakumar, A., Sridhar, G., & Jain, V. (2025). Dynamic Pricing Strategies Implementing Machine Learning Algorithms in E-Commerce. In Building Business Models with Machine Learning (pp. 129-136). IGI Global Scientific Publishing.

62. Suresh, N. V., Selvakumar, A., Sridhar, G., & Trivedi, S. (2024). A Research Study on the Ethical Considerations in Harnessing Basic Science for Business Innovation. In Unleashing the Power of Basic Science in Business (pp. 55-64). IGI Global.

https://doi.org/10.47059/AJMS/V4SI01/04

63. Helen, D., & Suresh, N. V. (2024). Generative AI in Healthcare: Opportunities, Challenges, and Future Perspectives. Revolutionizing the Healthcare Sector with AI, 79-90.

64. Suresh, N. V., Sridhar, J., Selvakumar, A., & Catherine, S. (2024). Machine Learning Applications in Healthcare: Improving Patient Outcomes, Diagnostic Accuracy, and Operational Efficiency. In AI Healthcare Applications and Security, Ethical, and Legal Considerations (pp. 1-9). IGI Global

65. Suresh, N. V., Karthikeyan, M., Sridhar, G., & Selvakumar, A. (2025). Sustainable urban planning through AI-driven smart infrastructure: A comprehensive review. Digital Transformation and Sustainability of Business, 178-180.

66. Suresh, N. V., Catherine, S., Selvakumar, A., & Sridhar, G. Transparency and accountability in big data analytics: Addressing ethical challenges in decision-making processes. In Digital Transformation and Sustainability of Business (pp. 742-745). CRC Press.

67. Suresh, N. V., Shanmugam, R., Selvakumar, A., & Sridhar, G. Patient-centric care optimization: Strategies for enhancing communication and efficiency in healthcare settings through cross-functional collaboration. In Digital Transformation and Sustainability of Business (pp. 738-741). CRC Press.

68. Kalaivani, M., Suganya, V., Suresh, N. V., & Catherine, S. (2025). The Next Wave in Marketing: Data Science in the Age of Generative AI. In Navigating Data Science (pp. 13-26). Emerald Publishing Limited.

69. Gokila, S., Helen, D., Alemu, A. M., & Suresh, N. V. (2024, November). Scaling Approach Over Learning Layer of Deep Learning Model to Reduce the FALSE Error

https://doi.org/10.47059/AJMS/V4SI01/04

in Binary Classification. In 2024 8th International Conference on Electronics, Communication and Aerospace Technology (ICECA) (pp. 1294-1300). IEEE.

70. Catherine, S., Suresh, N. V., Mangaiyarkarasi, T., & Jenefa, L. (2025). Unveiling the Enigma of Shadow: Ethical Difficulties in the Field of AI. In Navigating Data Science: Unleashing the Creative Potential of Artificial Intelligence (pp. 57-67). Emerald Publishing Limited.