



Algorithmic Credit Scoring Systems Optimizing Capital Access During Economic Shocks

Halimatus Sa'diyah*, Raudlotu Hikmah²

Universitas Nurul Jadid, Indonesia

Article History:

Received: 22 December 2025

Revised: 26 February 2026

Accepted: 28 March 2026

Keywords:

Algorithmic Credit Scoring,
Alternative Data, Financial
Inclusion, Economic Resilience

*Correspondence Address:

sadiyahaja25@gmail.com

Abstract:

Economic shocks increasingly challenge conventional credit assessment systems by limiting access to capital for vulnerable borrowers and small businesses. This study aims to examine how algorithmic credit scoring systems optimize capital access during periods of economic uncertainty. Using a qualitative multiple-case study design, data were collected through interviews with 24 participants, observations of digital lending operations, and analysis of institutional documents from financial service organizations. The findings reveal three key mechanisms: adaptive scoring improves lending resilience, alternative data expands borrower evaluation, and institutional collaboration strengthens credit allocation governance. This study contributes a resilience-oriented perspective by extending algorithmic credit research beyond predictive accuracy toward adaptive financial ecosystems. The findings recommend integrating dynamic algorithms, responsible data utilization, and collaborative governance to support inclusive and sustainable lending practices.

INTRODUCTION

The rapid expansion of digital financial services has transformed the way financial institutions evaluate creditworthiness, particularly during periods of economic uncertainty. Access to capital represents a fundamental driver of business continuity, household resilience, and economic recovery because timely financing enables productive investment and consumption stabilization (He et al., 2022; Mahroof et al., 2022; Zutshi et al., 2021). However, conventional lending mechanisms frequently struggle to respond efficiently to sudden economic disruptions due to lengthy assessments and rigid collateral requirements. Recent advances in artificial intelligence and machine learning have introduced algorithmic credit scoring systems capable of processing diverse financial and behavioral data in real time (Kumar et al., 2022; Norizan et al., 2025). These technologies promise faster, more inclusive, and data-driven lending decisions while reducing operational costs and improving financial accessibility across various socioeconomic groups, making their optimization increasingly significant for sustainable economic resilience.

Economic shocks, including financial crises, pandemics, geopolitical instability, and inflationary pressures, substantially disrupt the availability of credit for individuals and small businesses. During these periods, lenders

generally become more risk-averse by tightening lending standards, increasing collateral requirements, and limiting loan approvals despite growing financing needs (Balfour et al., 2022; Bernstein et al., 2022). Such conditions disproportionately affect micro, small, and medium enterprises, informal workers, and previously underserved borrowers whose financial records may not satisfy traditional credit evaluation standards. Although digital lending platforms have expanded significantly, many still rely on static scoring methodologies that inadequately capture rapidly changing borrower conditions during economic turbulence (Athief et al., 2023; Wysmulek et al., 2024). Consequently, the mismatch between urgent financing demand and conservative lending practices continues to constrain economic recovery and financial inclusion, highlighting the necessity for adaptive algorithmic credit assessment systems.

Previous studies have extensively examined algorithmic credit scoring from technological, financial, and regulatory perspectives. Shaamala et al. (2024), Govindan (2024), and Taimoor et al. (2022) demonstrated that machine learning algorithms consistently outperform traditional statistical approaches in predicting credit default risk. Suganya et al. (2024) and Devi et al. (2024) argued that digital footprints significantly improve the predictive accuracy of consumer credit assessment, particularly for borrowers with limited financial histories. Samonte et al. (2024), Emara et al. (2021), and Joshi et al. (2024) reported that fintech lending expands financial inclusion through alternative data utilization, while Brando et al. (2022), Jabrane et al. (2024) and Julião et al. (2023) emphasized the operational efficiency generated by artificial intelligence in loan underwriting processes. Nevertheless, existing studies primarily evaluate predictive accuracy, algorithm performance, or financial inclusion independently without comprehensively investigating how adaptive algorithmic credit scoring systems optimize capital accessibility during periods of severe economic shocks, thereby leaving an important theoretical and practical research gap.

The present study addresses this limitation by positioning algorithmic credit scoring within the broader context of economic resilience rather than merely predictive analytics. Unlike previous research emphasizing default prediction, this study conceptualizes adaptive credit scoring as a strategic mechanism that balances lending risk management with equitable capital distribution during unstable economic conditions (Arora et al., 2023; Sait et al., 2023). The proposed perspective integrates dynamic economic indicators, borrower behavioral adaptation, and contextual financial variables into a comprehensive analytical framework that reflects rapidly changing macroeconomic environments (Alshater et al., 2022; Mhlanga, 2025). Such an approach contributes to the evolving literature on financial technology by extending algorithmic decision-making beyond technical efficiency toward resilience-oriented financial governance.

Based on the identified theoretical and practical gaps, this research seeks to investigate how algorithmic credit scoring systems can optimize access to capital during periods characterized by significant economic shocks. Specifically, the study explores the capacity of adaptive algorithms to improve lending

decisions while simultaneously maintaining portfolio stability and expanding financial inclusion. Furthermore, it examines how alternative data use, predictive modeling, borrower heterogeneity, and changing macroeconomic conditions shape credit allocation outcomes. Understanding these interrelationships is essential because financial institutions increasingly rely on automated decision-support systems to respond to rapidly evolving market risks. Therefore, the central research problem is to identify the mechanisms through which adaptive algorithmic credit scoring enhances both financial resilience and equitable capital allocation during economic instability.

This study argues that adaptive algorithmic credit scoring systems provide a more resilient framework for capital allocation than conventional credit assessment models because they continuously incorporate multidimensional borrower information and evolving macroeconomic signals into lending decisions. It is hypothesized that integrating behavioral, transactional, and contextual economic indicators improves predictive reliability while simultaneously reducing financial exclusion during periods of uncertainty. The originality of this research lies in developing a resilience-oriented conceptual perspective that connects artificial intelligence, financial inclusion, credit risk management, and economic shock adaptation within a unified analytical framework. Consequently, the study contributes theoretically by enriching fintech and credit risk literature while offering practical implications for policymakers, financial institutions, and digital lending platforms seeking sustainable and inclusive financial systems under volatile economic conditions.

RESEARCH METHODS

This study employed a qualitative multiple-case study design to explore how algorithmic credit scoring systems optimize capital access during periods of economic shocks (Halkias et al., 2022). A qualitative approach was selected because the research sought to understand organizational practices, decision-making processes, and stakeholder experiences that cannot be adequately captured through numerical indicators alone. The multiple-case design enabled cross-case comparison among financial institutions implementing different algorithmic credit scoring models, thereby enhancing analytical depth and theoretical generalization. This design was considered appropriate because algorithmic lending decisions are shaped by technological capabilities, institutional policies, regulatory environments, and borrower interactions, all of which require contextual interpretation to explain adaptive credit allocation mechanisms during economic uncertainty.

The research was conducted in Jakarta and Bandung, Indonesia, because both cities represent major financial technology ecosystems where digital lending institutions, commercial banks, and regulatory agencies actively implement algorithmic credit scoring technologies. These locations also experienced significant lending adjustments during recent economic disruptions, making them suitable contexts for investigating adaptive credit allocation practices. The study involved 24 purposively selected informants, consisting of six fintech executives, five commercial bank credit managers, four data scientists

specializing in machine learning models, three financial regulators, and six borrowers representing micro, small, and medium enterprises. Their diverse professional backgrounds provided comprehensive perspectives regarding algorithm development, lending decisions, regulatory oversight, and borrower experiences.

Data were collected through semi-structured interviews, non-participant observations, and document analysis to obtain comprehensive evidence regarding algorithmic credit scoring implementation (Chu et al., 2024). Semi-structured interviews explored institutional strategies, model development processes, lending policies, and borrower experiences during economic shocks. Non-participant observations focused on operational credit evaluation workflows, decision-support systems, and interactions among lending personnel. Documentary evidence included institutional reports, fintech policy documents, regulatory guidelines, internal procedural manuals, and publicly available digital lending publications. These multiple sources enabled methodological triangulation while capturing both formal institutional practices and practical experiences. Data collection continued until thematic saturation was achieved, ensuring that no substantially new concepts emerged from subsequent interviews or documentary analysis.

The collected data were analyzed using the interactive qualitative analysis model consisting of data condensation, data reduction, data display, and conclusion verification (Kohn et al., 2024). Data condensation involved selecting relevant interview transcripts, observation notes, and documentary evidence associated with adaptive algorithmic credit scoring practices. During data reduction, information was systematically coded into emerging themes including predictive analytics, alternative data utilization, financial inclusion, institutional resilience, and lending governance. The organized findings were then presented through thematic matrices and conceptual relationship maps to facilitate interpretation across multiple cases. Finally, conclusions were continuously verified by comparing evidence from different data sources, ensuring logical consistency, analytical rigor, and credible interpretation throughout the research process.

The trustworthiness of the research was established through credibility, transferability, dependability, and confirmability (Kekeya, 2023). Credibility was strengthened using methodological triangulation across interviews, observations, and documentary analysis, complemented by member checking in which selected informants reviewed preliminary interpretations. Transferability was supported through detailed contextual descriptions of institutional environments, participant characteristics, and algorithmic credit scoring practices, enabling readers to assess applicability in comparable settings. Dependability was ensured by maintaining a comprehensive audit trail documenting research procedures, coding decisions, and analytical development throughout the study. Confirmability was enhanced through peer debriefing, reflexive documentation, and systematic comparison of evidence to minimize researcher bias and improve the objectivity of qualitative findings.

RESULTS AND DISCUSSION

Results

This study identified three interconnected findings explaining how algorithmic credit scoring systems optimize capital access during economic shocks. The findings demonstrate that lending resilience is strengthened through adaptive algorithmic adjustment, alternative data utilization, and institutional collaboration. The first finding highlights the role of dynamic scoring mechanisms in maintaining credit distribution despite uncertainty. The second finding emphasizes the contribution of alternative data in expanding borrower evaluation beyond conventional financial indicators. The third finding reveals that collaborative governance among institutions supports responsible and inclusive credit allocation. Together, these findings illustrate that algorithmic lending resilience is shaped by technological capability, data integration, and institutional coordination.

Adaptive Algorithmic Credit Scoring Enhances Lending Resilience

Adaptive algorithmic credit scoring enhances lending resilience by referring to the capability of digital credit assessment systems to continuously adjust borrower evaluations by integrating dynamic financial, behavioral, and contextual information during periods of economic disruption. Field findings indicate that resilience is reflected in the institution's ability to maintain responsible lending without substantially increasing default exposure despite rapidly changing market conditions. Rather than relying solely on historical repayment records, adaptive algorithms recalibrate borrower risk using updated transaction patterns, business performance indicators, and macroeconomic signals. Consequently, lending decisions become more responsive to economic uncertainty while preserving financial stability, supporting capital accessibility, and reducing unnecessary exclusion of potentially creditworthy borrowers experiencing temporary economic difficulties.

Interviews with financial institution representatives consistently revealed that adaptive credit scoring significantly improved lending continuity during economic shocks. A credit manager explained, "The algorithm no longer depends only on previous repayment records because it automatically incorporates recent transaction activities and cash flow fluctuations before generating credit recommendations." Similarly, a fintech executive stated, "Dynamic scoring allows us to continue financing productive borrowers even when conventional indicators temporarily deteriorate due to external economic pressures." These statements indicate that lending resilience emerged through continuous algorithmic adjustment rather than fixed assessment criteria. The researcher interprets that adaptive scoring enables institutions to distinguish temporary financial stress from long-term repayment risk, thereby sustaining prudent lending activities.

Additional interviews highlighted the strategic importance of interdisciplinary collaboration in strengthening adaptive scoring mechanisms. A data scientist reported, "Machine learning models continuously update risk weights whenever borrower behavior changes, allowing the system to react faster than manual assessments." Meanwhile, a financial regulator explained,

"Adaptive algorithms support financial stability because institutions can maintain credit distribution without excessively tightening lending standards during economic uncertainty." These findings demonstrate that technological adaptation operates alongside institutional governance rather than replacing human oversight. The researcher interprets algorithmic resilience as dependent on continuous model refinement, regulatory supervision, and organizational learning, creating a balanced approach between predictive accuracy, responsible lending, and sustainable financial inclusion.

Direct observations within participating financial institutions revealed that adaptive credit scoring platforms continuously displayed updated borrower profiles, transaction histories, repayment behaviors, and automated risk classifications through integrated digital dashboards. Credit officers regularly monitored algorithm-generated recommendations before making final lending decisions, while system interfaces highlighted changes in borrower risk following new financial activities. Researchers also observed periodic model recalibration conducted by technical teams after significant macroeconomic developments. These operational practices demonstrate that adaptive scoring functions serve as an ongoing decision-support mechanism rather than a one-time assessment process. In other words, field observations confirm that institutional resilience is strengthened through continuous algorithmic monitoring, systematic risk adjustment, and timely lending responses to evolving economic conditions.

The overall findings reveal a consistent pattern indicating that lending resilience is primarily achieved through continuous algorithm adaptation supported by institutional decision-making processes. Across all interviewed stakeholders, adaptive scoring was consistently associated with greater flexibility in evaluating borrower conditions during periods of economic instability. Interview evidence emphasized dynamic risk assessment, while field observations demonstrated the practical implementation of continuous monitoring and model recalibration within lending operations. Together, these findings suggest that algorithmic resilience is not merely a technological capability but an integrated organizational process combining artificial intelligence, professional judgment, and governance mechanisms. Consequently, adaptive credit scoring enables financial institutions to sustain responsible capital distribution despite rapidly changing economic environments.

Alternative Data Strengthens Inclusive Capital Access Mechanisms

Alternative data strengthens inclusive capital access mechanisms by referring to the operational use of non-traditional borrower information in credit assessment to complement conventional financial records. Field observations indicate that lending institutions increasingly evaluate digital transaction histories, e-commerce activities, utility payment consistency, mobile payment behavior, geolocation stability, and business platform interactions alongside traditional banking data. These additional indicators enable institutions to assess applicants with limited formal credit histories while maintaining prudent risk management. In practice, inclusive capital access is reflected in the institution's

ability to generate comprehensive borrower profiles from multiple digital sources, thereby expanding financing opportunities for underserved individuals and micro, small, and medium enterprises without compromising lending quality.

Paragraph 2 – Observation Results

Observed Operational Activity	Alternative Data Indicator	Observed System Function	Contribution to Credit Assessment
Digital transaction dashboard	Frequency and consistency of transactions	Automatic real-time synchronization	Measures business activity stability
E-commerce platform monitoring	Sales volume and customer orders	Integrated merchant analytics	Identifies operational sustainability
Digital payment verification	Utility and mobile payment records	Payment behavior monitoring	Evaluates repayment discipline
Machine learning processing	Behavioral pattern recognition	Dynamic risk classification	Improves borrower segmentation
Credit analyst workflow	Multi-source data validation	Recommendation review interface	Supports balanced lending decisions
Loan approval dashboard	Composite borrower scoring	Automated approval recommendation	Expands financing opportunities while controlling risk

The observational findings demonstrate that alternative data are systematically integrated into every stage of the digital credit assessment process rather than being treated as supplementary information. The observed workflow shows that transaction behavior, digital payments, commercial activities, and machine learning outputs collectively generate a multidimensional borrower profile before lending recommendations are produced. Credit analysts consistently reviewed algorithmic outputs alongside validated behavioral indicators through integrated dashboards, indicating that technology supported rather than replaced professional judgment. In sum, inclusive capital access is achieved because borrowers are evaluated using broader evidence of economic activity instead of relying exclusively on formal credit histories. Consequently, operational observations confirm that alternative data significantly improve fairness, responsiveness, and accessibility within contemporary lending systems.

The observed data reveal a consistent operational pattern in which alternative data flow sequentially through interconnected digital assessment stages before final lending decisions are produced. Every observed institution implemented automated data integration, behavioral analysis, machine learning classification, analyst verification, and approval recommendations within a unified workflow. No observation indicated dependence on a single financial indicator because multiple behavioral variables were continuously combined to strengthen borrower evaluation accuracy. This recurring pattern suggests that inclusive capital access emerges from comprehensive information integration rather than isolated technological innovation. Overall, the observations demonstrate that alternative data function as a central operational mechanism enabling broader financial inclusion while maintaining institutional risk control and decision consistency.

Institutional Collaboration Improves Credit Allocation During Shocks

Institutional collaboration improves credit allocation during shocks to coordinating fintech companies, commercial banks, regulatory authorities, and supporting digital infrastructure to ensure that capital continues flowing to productive borrowers despite economic disruption. Field documentation indicates that collaboration extends beyond information exchange by integrating regulatory guidance, algorithm governance, borrower verification, risk monitoring, and institutional oversight into a unified operational framework. Such collaboration enables participating institutions to share complementary resources while maintaining accountability and transparency throughout the lending process. Operationally, successful collaboration is reflected in coordinated decision-making, standardized governance procedures, continuous information sharing, and collective efforts to sustain responsible credit distribution during periods of heightened economic uncertainty.

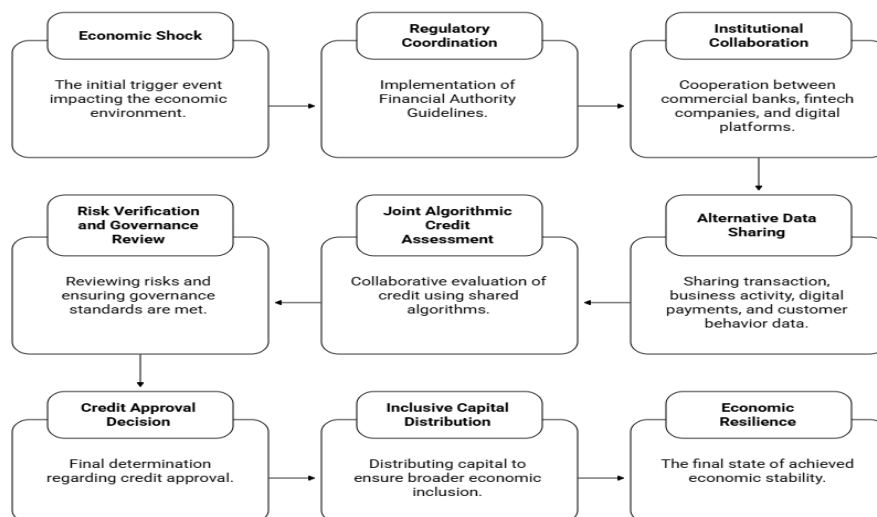


Figure 1. Economic Resilience Framework

The collected institutional documents consistently demonstrate that credit allocation during economic shocks is governed through structured collaboration rather than isolated organizational decisions. Cooperation agreements define responsibilities for data exchange, governance procedures establish standardized oversight of algorithms, and monitoring reports document continuous evaluation of lending performance across participating institutions. Internal workflow documents further illustrate that borrower verification, risk assessment, and approval processes are jointly coordinated before financing decisions are finalized. These documented practices indicate that collaborative governance supports operational consistency throughout the lending process.

Restating the documented findings, effective credit allocation does not rely exclusively on sophisticated algorithms but also depends on structured institutional relationships that support algorithm implementation. Documentation shows that each participating organization contributes complementary functions, including regulatory oversight, technological

infrastructure, operational verification, and portfolio monitoring, which collectively improve lending quality. Rather than operating independently, financial institutions establish interconnected governance structures that facilitate information sharing and coordinated decision-making. The researcher therefore interprets that institutional collaboration transforms algorithmic credit scoring into an integrated financial governance ecosystem where transparency, accountability, and shared responsibility reinforce lending resilience while expanding equitable access to productive capital during economic disruptions.

The documented evidence reveals a recurring pattern of collaboration beginning with regulatory coordination, followed by institutional cooperation, integrated data sharing, joint algorithmic assessment, governance verification, and responsible credit distribution. Every reviewed document consistently demonstrates interconnected responsibilities among participating organizations instead of fragmented operational practices. This sequence indicates that institutional collaboration is embedded throughout the entire lending cycle rather than limited to a single administrative stage. The observed pattern further suggests that successful capital allocation during economic shocks depends upon synchronized governance, standardized operational procedures, and continuous institutional communication. Overall, collaboration emerges as a systemic organizational capability that enhances both financial resilience and inclusive credit allocation across participating institutions.

Discussion

The finding that adaptive algorithmic credit scoring enhances lending resilience confirms previous studies emphasizing the superiority of machine learning-based credit assessment in improving risk prediction accuracy. Earlier research demonstrated that algorithmic models outperform traditional scoring approaches by identifying complex borrower patterns (Hilty et al., 2020; Rukhiran et al., 2023). However, this study extends existing literature by showing that algorithmic value is not limited to predictive performance but also relates to institutional resilience during economic shocks. Theoretically, this finding expands fintech and credit risk perspectives by positioning algorithms as adaptive governance instruments (Alchuban et al., 2022; Liu et al., 2023). Practically, financial institutions can utilize dynamic scoring models to maintain responsible lending decisions while responding more effectively to rapidly changing borrower conditions.

The finding regarding alternative data strengthening inclusive capital access mechanisms aligns with previous research highlighting the importance of digital footprints in improving credit accessibility for underserved populations. Existing literature primarily focuses on the predictive contribution of alternative data, whereas this study emphasizes its operational role in transforming lending workflows (Calvert et al., 2024; Sherry et al., 2023). The findings indicate that transaction behavior, digital activities, and business performance indicators enable institutions to evaluate borrowers previously excluded by conventional financial assessments. This contributes to financial inclusion studies by showing

that data diversification broadens definitions of creditworthiness. Finally, financial service providers can integrate alternative data responsibly to expand financing opportunities without significantly increasing credit risks (Devi Prasad Kotni, 2024; Yang et al., 2024).

The finding that institutional collaboration improves credit allocation during economic shocks supports previous arguments that fintech ecosystems require regulatory coordination and organizational integration to achieve sustainable financial innovation. Earlier studies mainly examined collaboration from regulatory or technological adoption perspectives, while this research reveals its importance as a resilience mechanism during periods of uncertainty (Ahmadzadeh et al., 2024; Oluleye et al., 2022; Qasimov et al., 2023). Theoretically, this finding strengthens institutional governance perspectives by demonstrating that algorithmic systems require collaborative structures to operate effectively. Practically, cooperation among banks, fintech companies, regulators, and data providers can improve transparency, strengthen oversight, and ensure that automated lending decisions remain accountable while supporting economic recovery.

The integrated findings reveal that algorithmic credit scoring should not be understood merely as a technological innovation but as a socio-technical system combining artificial intelligence, alternative information resources, and institutional governance. This perspective differs from previous research that often separates algorithm performance, financial inclusion, and regulatory issues into independent discussions. The study contributes theoretically by proposing a more comprehensive understanding of algorithmic lending resilience, where technological adaptation and institutional capability interact simultaneously. From a practical perspective, the findings encourage financial institutions to develop balanced strategies that combine automated decision-making with human supervision, ethical data management, and collaborative governance frameworks to achieve sustainable capital distribution.

Overall, this study demonstrates that optimizing capital access during economic shocks requires more than improving algorithm accuracy alone. The findings indicate that resilient lending emerges from the interaction between adaptive scoring mechanisms, comprehensive borrower information, and coordinated institutional practices. This contribution advances existing fintech literature by shifting attention from efficiency-oriented algorithm development toward resilience-oriented financial systems. Theoretically, the study provides a broader framework for understanding how digital financial technologies respond to economic uncertainty. Practically, policymakers and financial institutions can use these insights to design inclusive lending policies, strengthen digital financial infrastructure, and create adaptive credit ecosystems that support economic stability during future disruptions.

CONCLUSION

This study concludes that adaptive algorithmic credit scoring systems provide an important lesson that resilient capital access during economic shocks depends on the integration of technological adaptability, alternative data utilization, and institutional collaboration. The research contributes academically

by extending fintech and credit risk literature beyond predictive accuracy toward a resilience-oriented framework that explains how algorithmic systems support inclusive and sustainable lending decisions. However, this study is limited by its qualitative multiple-case approach and contextual focus on selected financial institutions, which may restrict broader generalization. Future research should employ comparative quantitative approaches, larger datasets, and cross-country analysis to validate and expand these findings.

ACKNOWLEDGEMENT

The authors express sincere appreciation to all financial institutions, professionals, regulators, and participants who contributed valuable insights and support throughout this research. Their cooperation and commitment enabled a deeper understanding of algorithmic credit scoring systems and their role in strengthening resilient and inclusive capital access.

REFERENCES

- Ahmadzadeh, A., Safarzadeh, E., & Atashak Maman, E. (2024). Comparing Optimal and Realized Investment Portfolio of Insurance Companies: A Case Study of a High Inflation Environment. *Iranian Economic Review*, 28(2), 462–488. <https://doi.org/10.22059/ier.2024.337167.1007362>
- Alchuban, M., Hamdan, A., & Fadhul, S. M. (2022). The Usage of Financial Technology Payments During the Pandemic of Covid-19. In *Studies in Computational Intelligence* (Vol. 1037, pp. 427–441). https://doi.org/10.1007/978-3-030-99000-8_24
- Alshater, M. M., Saba, I., Supriani, I., & Rabbani, M. R. (2022). Fintech in Islamic Finance Literature: A Review. In *Heliyon* (Vol. 8, Issue 9). <https://doi.org/10.1016/j.heliyon.2022.e10385>
- Arora, S., & Madan, P. (2023). Conceptual Framework Depicting the Drivers for the Fintech Growth: An Outlook for India. In *Contemporary Studies of Risks in Emerging Technology, Part A* (pp. 197–220). <https://doi.org/10.1108/978-1-80455-562-020231014>
- Athief, F., & Zakiy, F. S. (2023). Surviving Amidst Pandemic: Indonesian Islamic Microfinance Experience. *International Journal of Advanced and Applied Sciences*, 10(3), 119–129. <https://doi.org/10.21833/ijaas.2023.03.016>
- Balfour, M. E., Delany-Brumsey, A., Winsky, J., & Goldman, M. L. (2022). Cops, Clinicians, or Both? Collaborative Approaches to Responding to Behavioral Health Emergencies. In *Psychiatric services (Washington, D.C.)* (Vol. 73, Issue 6, pp. 658–669). <https://doi.org/10.1176/appi.ps.202000721>
- Bernstein, A., & Possin, L. (2022). Facilitators and Barriers to Dementia Assessment and Diagnosis: Perspectives From Dementia Experts Within a Global Health Context. *Frontiers in Neurology*, 13. <https://doi.org/10.3389/fneur.2022.769360>

- Brando, V. V., & Lopez, D. M. (2022). Financial System: Challenges and Opportunities of Digital Transformation in Mexico. In *Data Analytics Applications in Emerging Markets* (pp. 23–48). https://doi.org/10.1007/978-981-19-4695-0_2
- Calvert, M. D., Neill, C. L., Ac-Pangan, M. F., Stewart, A. C., & Lahne, J. (2024). Development of a Hard Cider Flavor Wheel Using Free Word Sorting and Multivariate Statistical Techniques. *Journal of Sensory Studies*, 39(2). <https://doi.org/10.1111/joss.12916>
- Chu, H. C., Chang, M. K., & Chen, Y. C. (2024). Meta-Analysis of Emotional Labor. *Bulletin of Educational Psychology*, 55(4), 847–874. [https://doi.org/10.6251/BEP.202406_55\(4\).0009](https://doi.org/10.6251/BEP.202406_55(4).0009)
- Devi Prasad Kotni, V. V. (2024). E-Wallet Literacy Scale Development and Validation. *Indian Journal of Finance*, 18(1), 8–28. <https://doi.org/10.17010/ijf/2024/v18i1/171963>
- Emara, N., & Zhang, Y. (2021). The Non-Linear Impact of Digitization on Remittances Inflow: Evidence from the BRICS. *Telecommunications Policy*, 45(4). <https://doi.org/10.1016/j.telpol.2021.102112>
- Govindan, K. (2024). Unlocking the Potential of Quality as a Core Marketing Strategy in Remanufactured Circular Products: A Machine Learning-Enabled Multi-Theoretical Perspective. *International Journal of Production Economics*, 269. <https://doi.org/10.1016/j.ijpe.2023.109123>
- Halkias, D., Neubert, M., & Harkiolakis, N. (2022). The Multiple Case Study Design: Methodology and Application for Management Education. In *The Multiple Case Study Design: Methodology and Application for Management Education*. Routledge. <https://doi.org/10.4324/9781003244936>
- He, Y., & Tri (2022). Urban Utopia or Pipe Dream? Examining Chinese-Invested Smart City Development in Southeast Asia. *Third World Quarterly*, 43(9), 2244–2268. <https://doi.org/10.1080/01436597.2022.2089648>
- Hilty, D., Chan, S., Torous, J., Luo, J., & Boland, R. (2020). A framework for Competencies for the Use of Mobile Technologies in Psychiatry and Medicine: Scoping Review. In *JMIR mHealth and uHealth* (Vol. 8, Issue 2). <https://doi.org/10.2196/12229>
- Jabrane, A., & Hanane, E. (2024). Impact of Digital Financial Services on Income Inequality: Microeconomic Evidence from Africa. In *Sustainable Development Goals: Technologies and Opportunities* (pp. 168–188). <https://doi.org/10.1201/9781003468257-10>
- Joshi, K., & Dwivedi, R. (2024). E-payments in Microfinance: Evolution and Benefits. In *Transforming the Financial Landscape With ICTs* (pp. 226–252). <https://doi.org/10.4018/979-8-3693-1503-3.ch011>
- Julião, J., Ayllon, T., & Gaspar, M. (2023). Financial Inclusion Through Digital Banking: The case of Peru. In *Lecture Notes in Mechanical Engineering* (pp. 294–304). https://doi.org/10.1007/978-3-031-09360-9_24
- Kekeya, J. (2023). Qualitative Case Study Research Design : The Commonalities and Differences between Collective, Intrinsic and Instrumental Case Studies. *Contemporary PNG Studies*, 36(2008), 29–30. <https://doi.org/10.3316/informit.356219476950585>

- Kohn, L., & Christiaens, W. (2024). Qualitative Research Methods: Contributions and Beliefs. *Reflets et Perspectives de La Vie Economique*, 53(4), 67–82. <https://doi.org/10.3917/rpve.534.0067>
- Kumar, S., Rao, S., Goyal, K., & Goyal, N. (2022). Journal of Behavioral and Experimental Finance: A bibliometric overview. *Journal of Behavioral and Experimental Finance*, 34, 100652. <https://doi.org/10.1016/j.jbef.2022.100652>
- Liu, Z., Zhang, Z., Yang, H., Wang, G., & Xu, Z. (2023). An Innovative Model Fusion Algorithm to Improve the Recall Rate of Peer-To-Peer Lending Default Customers. *Intelligent Systems with Applications*, 20. <https://doi.org/10.1016/j.iswa.2023.200272>
- Mahroof, K., Omar, A., & Kucukaltan, B. (2022). Sustainable Food Supply Chains: Overcoming Key Challenges Through Digital Technologies. *International Journal of Productivity and Performance Management*, 71(3), 981–1003. <https://doi.org/10.1108/IJPPM-12-2020-0687>
- Mhlanga, D. (2025). The State of Financial Inclusion in Sub-Saharan Africa. In *Financial Inclusion and Sustainable Development in Sub-Saharan Africa* (pp. 8–31). <https://doi.org/10.4324/9781003515715-2>
- Norizan, S. N. B., Abu Bakar, N. B., Iqbal, M. S., & Idris, I. B. M. (2025). Examining Financial Well-Being among Students: Islamic Social Finance and Theory of Planned Behavior Approach. *Review of Islamic Social Finance and Entrepreneurship*, 1–16. <https://doi.org/10.20885/risfe.vol4.iss1.art1>
- Oluleye, B. I., Chan, D. W. M., & Olawumi, T. O. (2022). Barriers to Circular Economy Adoption and Concomitant Implementation Strategies in Building Construction and Demolition Waste Management: A PRISMA and Interpretive Structural Modeling Approach. In *Habitat International* (Vol. 126). <https://doi.org/10.1016/j.habitatint.2022.102615>
- Qasimov, C. Y. O., & Ələsgərova, F. Q. Q. (2023). Justification Of The Concepts of Employment and Unemployment: Scientific Nature and Modern Approach. *Romaya Journal: Researches on Multidisciplinary Approaches*, 3(1), 155–165. <https://doi.org/10.36719/2663-4619/80/19-27>
- Rukhiran, M., Wong-In, S., & Netinant, P. (2023). IoT-Based Biometric Recognition Systems in Education for Identity Verification Services: Quality Assessment Approach. *IEEE Access*, 11, 22767–22787. <https://doi.org/10.1109/ACCESS.2023.3253024>
- Sait, M. A., Anshari, M., & Masri, M. (2023). Digital Wallet Adoption in Supporting Financial Inclusion: A Conceptual Framework. In *2023 International Conference on Sustainable Islamic Business and Finance, SIBF 2023* (pp. 189–194). <https://doi.org/10.1109/SIBF60067.2023.10380043>
- Samonte, M. J. C., & Justo, A. R. L. (2024). Mitigating Risk in the Digital Age: An Analysis of Security Measures for Cashless Payments in Developing Countries. In *2024 4th International Conference on Computer Systems, ICCS 2024* (pp. 186–191). <https://doi.org/10.1109/ICCS62594.2024.10795842>
- Shaamala & Nyandega. (2024). Algorithmic green Infrastructure Optimisation: Review of Artificial Intelligence-driven approaches. In *Sustainable Cities and Society* (Vol. 101). <https://doi.org/10.1016/j.scs.2024.105182>

- Sherry, N. L., Valcanis, M., Sait, M. L., Stinear, T. P., Howden, B. P., & Seemann, T. (2023). An ISO-certified Genomics Workflow for Identification and Surveillance of Antimicrobial Resistance. *Nature Communications*, 14(1). <https://doi.org/10.1038/s41467-022-35713-4>
- Suganya, B., Devipriya, C., Suresh, G. R., Vinotha Vasuki, A., Chadge, R., & Al Sherideh, A. (2024). Experimental Evaluation of Identifying Fraudulent Activities in E-Commerce to Protect Consumers by Using Intelligent Deep Learning Methodology. In *Proceedings of the 2024 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems, ICSES 2024*. <https://doi.org/10.1109/ICSES63760.2024.10910517>
- Taimoor, N., & Rehman, S. (2022). Reliable and Resilient AI and IoT-based personalised healthcare services: A Survey. *IEEE Access*, 10, 535–563. <https://doi.org/10.1109/ACCESS.2021.3137364>
- Wysmulek, I., & Wysmulek, J. (2024). Generational Differences in Attitudes to Meritocracy: Sources of Change in Valuing Education, Innate Abilities, and Hard Work in Poland. *Acta Sociologica (United Kingdom)*, 67(2), 131–148. <https://doi.org/10.1177/00016993231173296>
- YANG, Q., & SHI, F. (2024). A Technology Acceptance Model (TAM) towards the use Intention of E-wallet Among Youth in Malaysia. *UCJC Business and Society Review*, 21(80), 18–47. <https://doi.org/10.3232/UBR.2024.V21.N1.01>
- Zutshi, A., Mendy, J., Sharma, G. D., Thomas, A., & Sarker, T. (2021). From Challenges to Creativity: Enhancing Smes' Resilience in the Context of Covid-19. In *Sustainability (Switzerland)* (Vol. 13, Issue 12). <https://doi.org/10.3390/su13126542>