

How Data and Automation Transformed Small Business Lending Amid COVID-19

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Abstract: *The global COVID-19 pandemic triggered unprecedented economic disruptions, severely impacting micro, small, and medium enterprises (MSMEs) across developing economies. In Nigeria, small businesses, already grappling with limited access to credit, encountered additional constraints as traditional loan disbursement systems became overwhelmed by the volume and urgency of pandemic-related relief applications. Manual lending processes, characterized by bureaucratic delays and in-person verifications, proved ill-equipped to handle the crisis, prompting an accelerated shift toward data-driven digital solutions. In response, financial institutions—ranging from commercial banks to fintech startups—deployed automation technologies to streamline loan origination, eligibility assessments, fraud detection, compliance reporting, and customer engagement. These technologies not only enhanced the speed and accuracy of credit delivery but also contributed to greater transparency and accountability in the disbursement of public funds. This paper investigates the transformative role of automation in Nigeria’s small business lending landscape during COVID-19. Using a mixed-method research design, we surveyed 500 key stakeholders, including small business owners, financial service providers, fintech innovators, and regulatory officials. The findings reveal that automation significantly improved loan approval timelines, increased user satisfaction, and enhanced fraud prevention capabilities. Furthermore, the study underscores automation’s long-term potential in deepening financial inclusion, improving regulatory oversight, and driving operational efficiency within Nigeria’s financial sector. By offering empirical insights, this research contributes to the evolving discourse on digital transformation in emerging markets and provides a framework for future innovation in crisis-resilient financial systems.*

Keywords: automation, small business lending, COVID-19, Nigeria, financial services, digital transformation

INTRODUCTION

The outbreak of the COVID-19 pandemic sent shockwaves across global economies, disrupting business operations, destabilising supply chains, and intensifying financial uncertainty. In Nigeria,

the impact was particularly profound on micro, small, and medium enterprises (MSMEs), which collectively contribute over 50% to the nation's GDP and form the backbone of employment (Chondough, 2021; Akpan et al., 2022). Nigerian small businesses are already faced with limited access to affordable credit and severe liquidity shortages during the pandemic. Government relief programs were swiftly rolled out to support MSMEs, but traditional lending infrastructures, marked by slow manual processes and centralized physical verifications, were incapable of responding effectively to the surge in loan demand (Arinzeh, 2022).

Therefore, the pandemic exposed deep-rooted inefficiencies in Nigeria's financial systems and catalyzed a rapid pivot toward digital transformation (Agarwal et al., 2024). Financial institutions, regulatory agencies, and fintech providers turned to automation and data-driven technologies as a way to streamline loan processing, improve risk assessments, and maintain service continuity under lockdown conditions (Akpan et al., 2022). According to Subramanyam (2024), Technologies such as artificial intelligence (AI), predictive analytics, robotic process automation (RPA), and digital identity verification became essential components of the lending ecosystem. These innovations enabled faster loan approvals, improved fraud detection, and allowed institutions to comply with evolving regulatory requirements—all while minimizing face-to-face interactions (Theodos et al., 2022).

The adoption of automation in this context was not merely a matter of convenience; it became a necessity for resilience. Predictive analytics, in particular, played a crucial role by analyzing vast volumes of historical and real-time data to inform credit decisions, anticipate borrower defaults, and identify patterns of fraud (Subramanyam, 2024). These advancements allowed financial institutions to disburse loans more efficiently and accurately, ensuring that support reached the businesses most in need.

Despite the clear shift in lending practices, there remains a notable gap in empirical research that explores how automation and data analytics transformed small business financing in Nigeria during this unique period (Odio et al., 2021). Existing studies often focus on the broader rise of fintech or the challenges of financial inclusion but rarely interrogate the direct relationship between crisis response, technological adoption, and institutional efficiency within the Nigerian context (Ediagbonya & Tioluwani 2023). Moreover, while global narratives emphasize the benefits of digitization, they often overlook the localized infrastructural, regulatory, and socio-economic constraints that shape implementation outcomes in emerging markets (Akpan et al., 2022).

This study draws on two key theoretical perspectives to frame the investigation. First is Rogers' Diffusion of Innovation Theory (Rogers et al., 2014), which explains how new technologies spread through populations in response to perceived benefits and external pressures. The urgency of the COVID-19 crisis accelerated the diffusion of automation tools among financial institutions, driven by the need to sustain operations and serve growing customer demands (Amankwah-Amoah et al., 2021). Second is the Structural Contingency Theory, which posits that organizational effectiveness improves when operational structures align with environmental demands. In this case, automation

served as a structural adjustment to the pandemic's disruptions, enabling banks and fintechs to adapt to the dynamic conditions and continue delivering credit services efficiently (Pennings, 2013). Guided by these theoretical foundations, this study addresses the following primary research question:

How did data and automation impact small business lending in Nigeria during the COVID-19 pandemic? In seeking to answer this question, the research asked several sub-questions (Chondough, 2021; Akpan et al., 2022): What role did automation play in streamlining loan approvals and disbursements? How effective were automated compliance and fraud detection systems in reducing financial risks for both lenders and borrowers? What challenges did small businesses face in accessing loans during the pandemic, and how were these addressed through automation? Finally, what is the long-term impact of automation on small business financing in Nigeria in the post-pandemic era?

To achieve these aims, the study sets out the following objectives:

It seeks to examine the role of data and automation in enhancing access to small business loans during the COVID-19 crisis in Nigeria. It aims to evaluate the effectiveness of automated credit scoring models and AI-based underwriting in speeding up loan approvals. It also analyzes how automation supports regulatory compliance and fraud prevention across institutions (Theodos et al., 2022; Odio et al., 2021). Furthermore, the research assesses the key challenges encountered by MSMEs in the lending process and how automation helped to mitigate those issues. Lastly, it explores the enduring implications of digital automation for the future of small business financing, particularly in fostering financial inclusion and operational sustainability.

To provide a robust and well-rounded analysis, the study adopts a mixed-method research design. Quantitatively, a structured questionnaire was distributed to 500 stakeholders, including small business owners, bank employees, FinTech operators, and regulatory officials. The survey assessed experiences with automated lending platforms, loan access, fraud mitigation, and customer service improvements. Qualitatively, a systematic literature review was conducted, covering peer-reviewed articles, institutional reports, and regulatory guidelines published between 2020 and 2025. This dual approach allows for both empirical validation and contextual understanding of automation's role during the pandemic.

Through this research, the paper aims to make a valuable contribution to the growing discourse on digital transformation in financial services, particularly within the African context. It offers evidence-based insights that can guide policymakers, financial institutions, and technology developers in building more inclusive, resilient, and technology-driven credit systems for small businesses in Nigeria and similar emerging economies.

LITERATURE REVIEW AND THEORETICAL UNDERPINNING

The COVID-19 pandemic marked a turning point for financial service delivery across the globe, especially in emerging economies like Nigeria, where digital infrastructure and financial inclusion were still developing. As traditional systems faltered under the weight of urgent credit demand, automation and data-driven technologies became critical to maintaining lending operations. This section reviews relevant literature on digital transformation in the financial sector, particularly in the context of small business lending, and outlines the theoretical framework guiding the current study.

Digital Transformation in Financial Services

Before the pandemic, financial institutions globally had begun incorporating automation into various aspects of service delivery (Theodos et al., 2022). However, this digital shift was gradual and often constrained by regulatory hesitation, budget limitations, and customer adoption rates. COVID-19 accelerated this process dramatically. According to Cong et al. (2021), the pandemic created an imperative for rapid digitization as institutions sought to maintain operational continuity while addressing surging demand for relief credit. In Nigeria, where many small businesses are informal or underbanked, this digital push created new opportunities and challenges (Singh et al., 2024).

Fintech companies in Nigeria played a crucial role in this transition. Research by Ediagbonya & Tioluwani (2023) shows that digital lenders outpaced traditional banks in deploying mobile-first lending solutions, automated credit scoring, and real-time decision-making systems. These fintech solutions often relied on non-traditional data, such as mobile phone usage, e-commerce activity, and social behavior, to assess borrower risk in the absence of formal credit history.

Automation and Credit Risk Management

Automation tools such as AI, predictive analytics, and machine learning have significantly altered the approach to credit risk assessment. Studies by Theodos et al. (2022) and Cong et al. (2021) emphasize that automated underwriting systems can process loan applications more quickly, reduce administrative costs, and detect risk patterns with greater precision than manual methods. During the pandemic, these capabilities became essential as financial institutions faced both increased application volume and elevated default risks.

In Nigeria, banks and fintechs adopted AI-powered platforms to assess loan eligibility and deploy capital at scale. According to Ediagbonya & Tioluwani (2023), automated systems also enable lenders to personalize loan terms and repayment structures based on real-time income data and behavioral patterns, thereby reducing default rates and improving customer satisfaction.

Compliance and Fraud Detection

Okegbola & Akiotu (2024) talked about the key area where automation proved transformative is in regulatory compliance and fraud mitigation. Compliance with anti-money laundering (AML)

and know-your-customer (KYC) regulations typically requires labour-intensive verification procedures. However, the use of intelligent automation and digital identity verification streamlined these processes during the COVID-19 emergency, allowing institutions to remain compliant despite remote operations (Chondough, 2021).

Fraud prevention also improved significantly with the use of pattern recognition algorithms and anomaly detection tools (Okegbola & Akiotu, 2024). Financial institutions could flag suspicious applications or behaviors in real time, thus protecting both public funds and institutional capital. In the Nigerian context, where fraud and documentation forgery are recurring concerns, these systems added a vital layer of security to emergency lending operations.

Barriers to Automation: The Role of Digital Literacy and Infrastructure

Despite the clear benefits, several studies highlight barriers to the successful deployment of automation in emerging markets. Digital exclusion, poor internet connectivity, low smartphone penetration, and limited digital literacy among small business owners hindered widespread adoption (Bello & Ajao 2024). These issues created disparities in access, with rural or informal businesses often left behind in the digital lending transformation.

Ethical concerns related to algorithmic bias, data privacy, and user consent have surfaced in global discourse. As noted by Tsamados et al. (2021), over-reliance on opaque AI systems can perpetuate inequalities if the underlying data reflects historical discrimination or structural disparities.

Theoretical Framework

To contextualize these dynamics, this study draws on two interrelated theoretical models: Diffusion of Innovation Theory and Structural Contingency Theory. Rogers' Diffusion of Innovation Theory (Rogers et al., 2014) provides a framework for understanding how new technologies, such as automation in lending, are adopted within organizations and among user groups. According to Rogers et al. (2014), the theory, adoption is influenced by perceived advantage, compatibility with existing systems, complexity, trialability, and observability. In the case of Nigeria, the pandemic acted as an external pressure that significantly accelerated the adoption of automation across the financial sector. Financial institutions that might otherwise have hesitated to digitize were compelled to innovate to survive.

Structural Contingency Theory posits that organizations must align their internal structures with external environmental conditions to remain effective (Pennings, 2013). During the pandemic, traditional banking structures proved incompatible with the urgent, high-volume demands for small business loans. The deployment of automation represented a structural adjustment that enabled institutions to respond more effectively to a rapidly changing environment (Amankwah-Amoah et al., 2021). By realigning systems with external pressures, Nigerian banks and fintechs increased their operational efficiency and improved their service delivery outcomes.

Literature Gap and Contribution.

While global studies have documented the role of automation in financial resilience, there remains limited empirical research focused on the Nigerian context, especially as it relates to MSME lending during COVID-19 (Otokiti et al., 2022). Much of the available literature addresses either fintech adoption in general or financial inclusion strategies without adequately capturing the systemic changes that occurred in the lending process during the pandemic (Petighin, 2023). Moreover, few studies integrate both qualitative stakeholder insights and quantitative performance metrics to assess the true impact of automation.

This study addresses that gap by combining a stakeholder-based survey with a systematic review of relevant literature to provide a comprehensive analysis. It offers empirical evidence on how data and automation shaped the efficiency, inclusiveness, and sustainability of small business lending in Nigeria during a time of crisis. By doing so, it contributes to both the theoretical discourse on innovation diffusion and the practical debate on building more resilient financial ecosystems in the developing world.

METHODOLOGY

This study adopts a mixed-method research design that combines both quantitative and qualitative approaches to explore how data and automation transformed small business lending in Nigeria during the COVID-19 pandemic (Nalisa, 2022). The research relies on a convergent parallel design, allowing quantitative and qualitative data to be collected simultaneously and later integrated during analysis to provide a comprehensive understanding of the topic.

The quantitative aspect of the research was carried out using a structured questionnaire administered to a total of 500 respondents (Clampitt 2009). These participants included small business owners (60%), bank employees (25%), fintech representatives (10%), and regulatory officials (5%), selected through stratified random sampling to ensure balanced representation across the stakeholder groups. The questionnaire was designed to capture information on access to credit, awareness and use of automation tools, fraud prevention, compliance mechanisms, user satisfaction, and challenges experienced during the pandemic. The questionnaire was distributed both online and physically in various regions of Nigeria, including Lagos, Abuja, Kano, and Enugu, between February and March 2025.

In addition to the quantitative data, the study also conducted a systematic literature review to gain contextual insights and theoretical support for the analysis (Arevalo 2024). This review followed the PRISMA guidelines and involved sourcing peer-reviewed articles, institutional reports, policy briefs, and scholarly publications from academic databases such as JSTOR, ScienceDirect, Google Scholar, and Scopus (Arevalo 2024). The review focused on publications from 2020 to 2025 that addressed themes such as digital lending, automation, fintech in crisis response, and financial inclusion in Nigeria and other emerging markets.

Descriptive statistical analysis was applied to the quantitative data, including the use of percentages, frequencies, and mean scores to identify trends and stakeholder perceptions (George & Mallery 2018). Visual representations such as charts and tables were generated to present the findings. For the qualitative component, thematic analysis was used to identify recurring patterns and insights, both from open-ended responses in the questionnaire and from the reviewed literature. Themes such as automation efficiency, compliance adaptation, digital inequality, and fraud mitigation were extracted and mapped to the theoretical framework guiding the study (Castleberry & Nolen 2018).

Ethical considerations were rigorously observed throughout the research process. Informed consent was obtained from all participants, and data was collected anonymously to ensure confidentiality (Kang & Hwang, 2021). The study adhered to the ethical guidelines concerning privacy, voluntary participation, and the right to withdraw at any time.

By integrating quantitative data from stakeholder experiences and qualitative insights from academic literature, this methodology offers a robust foundation for understanding the practical and strategic impact of automation in Nigeria's small business lending sector during a time of unprecedented disruption (Kang & Hwang, 2021; Arevalo, 2024).

RESULTS AND FINDINGS

This study uncovers how data and automation have transformed Nigeria's small business lending sector amid the COVID-19 pandemic. It draws from responses of 500 stakeholders—including small business owners, bank personnel, fintech representatives, and regulators, combining quantitative findings from structured questionnaires aimed at evaluating how automation and data analytics have reshaped small business lending during the pandemic with qualitative insights from a thorough literature review. This integrated approach provides a comprehensive understanding of automation's diverse effects on lending operations, efficiency, compliance, and user experience. The analyzed data includes responses from 500 participants: small business owners (60%), bank employees (25%), fintech experts (10%), and regulatory officials (5%). The findings are examined across four key aspects: loan approval processes, fraud detection and compliance, accessibility of automated platforms, and stakeholder perceptions of the benefits and risks of automation.

Table 1: Stakeholders

Stakeholders	Percentage
small business owners	(60%),
bank employees	(25%),
fintech experts	(10%)
regulatory officials	(5%)

Impact of Automation on Lending Efficiency

The COVID-19 pandemic exerted unprecedented pressure on financial systems to disburse relief funds and loans promptly. A key objective of this research was to assess whether automation helped financial institutions meet this urgent demand. According to the results in Table 2, automation significantly improved the speed of loan approvals; 44.6% of respondents reported that automation significantly reduced loan approval times, another 35.4% observed a moderate improvement, and only 20% indicated no change in the speed of loan processing.

This indicates that nearly 80% of respondents acknowledged some level of positive impact in terms of processing efficiency. This finding supports the hypothesis that automation tools—such as AI-powered underwriting, credit-scoring models, and workflow management systems—helped banks manage surging application volumes during the crisis.

Limitations in Fraud Detection and Loan Restructuring

While speed improved, the data also revealed important limitations. All 500 respondents unanimously reported that automation did not improve Fraud detection capabilities, Transparency in eligibility requirements, or Provisions for loan restructuring. This result is noteworthy. Despite the availability of fraud prevention technologies (e.g., AI for identity verification and predictive analytics), none of the stakeholders reported seeing an improvement in these areas during the pandemic. It is possible that while the tools existed, they were not effectively implemented or lacked the necessary data training to perform accurately at scale.

When asked about restructuring flexibility, only 36.3% of respondents said automation made it easier to request modifications to their loan terms, while 63.7% disagreed. This reflects the rigidity of most automated systems, which were not fully adapted to handle loan deferrals or adjustments under emergency conditions.

Accessibility of Online Lending Platforms

As the pandemic restricted physical movement, automation enabled access to financial services through digital platforms; 70.6% of respondents preferred online channels (website or mobile app) for loan applications. Only 18.2% still used in-person applications, and 11.2% relied on third-party agents or intermediaries.

This apparent preference for digital platforms highlights how the pandemic accelerated digital transformation in Nigeria's financial ecosystem. It also confirms that automated, self-service systems—such as mobile loan apps, chatbots, and digital dashboards- were crucial in maintaining continuity of service.

However, the ease of using these platforms varied; 20.2% rated the platforms as "very easy to use", 54.2% found them "somewhat easy", while 25.6% faced difficulties.

This suggests that while digital adoption was high, user experience design and platform stability varied, possibly influenced by regional internet accessibility and digital literacy levels.

Table 2: Automation Impact on Lending Efficiency and Access

Survey Item	Response	Frequency (n)	Percentage (%)
How did automation impact loan approvals?	Reduced loan approval time significantly	223	44.6
	Reduced loan approval time moderately	177	35.4
	No impact	100	20.0
Did data-driven automation improve the ability to detect fraudulent loan applications?	Yes	0	0.0
	No	500	100.0
Did automation make loan eligibility requirements clearer?	Yes	0	0.0
	No	500	100.0
Did automation play a role in loan restructuring during COVID-19?	Yes	0	0.0
	No	500	100.0
Did automation make it easier to request loan restructuring?	Yes	182	36.3
	No	318	63.7
How would you rate the ease of applying for a loan online during COVID-19?	Very easy	101	20.2
	Somewhat easy	271	54.2
	Difficult	128	25.6
What was/is the preferred method of loan application?	Online (website or mobile app)	353	70.6
	In-person at a bank	91	18.2
	Via a third-party agent or intermediary	56	11.2

Challenges, Regulatory Concerns, and Perceived Benefits

The study also explored the major barriers and perceived outcomes of automation from both lenders' and borrowers' perspectives. As seen in Table 3, the top challenges in implementing digital lending systems included technical limitations and infrastructure (29.0%), Resistance from users unfamiliar with digital systems (26.6%), Lack of reliable data for risk evaluation (24.0%), and Fraud and identity verification issues (20.4%). Moreover, key user-side challenges during the pandemic were delays in approval (36.2%) and technical difficulties (35.2%). These statistics

highlight how the success of automation hinges not just on software but also on the availability of supporting infrastructure—like electricity, internet coverage, and trained personnel.

From a regulatory perspective, the main concerns centered on Data privacy and security risks (37.4%), Potential exclusion of underserved businesses (32.6%), and Increased risk of algorithmic fraud (30.0%). Despite these concerns, participants saw automation's greatest strengths in Improved fraud detection (26.4%), Faster processing (25.8%), reduced paperwork (25.4%), and Wider access to funding (22.4%).

Finally, in terms of future outlook, 51.2% believe automation will improve efficiency and accessibility, and 48.8% see its potential to reduce human bias in lending decisions.

Table 3: Summary of Challenges, Regulatory Concerns, and Perceived Benefits of Automation

Survey Item	Response	Frequency (n)	Percentage (%)
What was the biggest challenge in digitizing the lending process?	Technical limitations/infrastructure challenges	145	29.0
	Resistance from customers unfamiliar with digital systems	133	26.6
	Lack of reliable data for credit scoring	120	24.0
	Fraud & identity verification issues	102	20.4
What is the biggest challenge you faced when applying for or processing loans during COVID-19?	Delays in approval	181	36.2
	Technical difficulties in using digital platforms	176	35.2
	Strict eligibility requirements	143	28.6
What is the biggest regulatory concern regarding automated lending?	Data privacy & security risks	187	37.4

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	Potential exclusion of underserved businesses	163	32.6
	Increased susceptibility to fraud	150	30.0
What do you think is the biggest advantage of using automation in lending?	Improved fraud detection	132	26.4
	Faster processing time	129	25.8
	Reduced paperwork	127	25.4
	Better access to financing for small businesses	112	22.4
How do you see the future role of automation in small business lending?	It will improve efficiency and accessibility	256	51.2
	It will reduce human bias in lending decisions	244	48.8

DISCUSSION

The findings from this study provide compelling evidence that data and automation significantly reshaped small business lending practices in Nigeria during the COVID-19 pandemic (Bai et al., 2021). As traditional banking systems struggled to meet the surge in demand for relief loans and emergency financing, the deployment of automated tools introduced much-needed efficiency and responsiveness into the financial ecosystem (Kamal et al., 2025). The data reveals that a combined 80% of respondents observed either significant or moderate improvements in the speed of loan approvals following the introduction of automation (Adewale et al., 2025). This suggests that technology such as AI-driven credit scoring, automated underwriting, and digital loan origination systems played a pivotal role in enhancing the timeliness of lending decisions.

However, the study also uncovered critical limitations in the application of automation within the lending environment (Adewale et al., 2025). Despite the promise of artificial intelligence and big data for fraud detection, none of the respondents reported noticeable improvements in identifying fraudulent loan applications. This may be attributed to gaps in data integration, inadequate fraud prevention models, or the underutilization of real-time verification technologies (Demirgüç-Kunt et al., 2022; Bai et al., 2021). Automation did not appear to enhance the transparency of loan eligibility requirements or the flexibility of restructuring loan agreements. This finding points to a potential rigidity in existing digital lending frameworks, which, while efficient in processing

standard loan applications, were not adaptable enough to accommodate the nuanced and urgent restructuring needs that arose during the pandemic.

The accessibility of digital platforms emerged as a defining element of financial resilience. Over 70% of respondents expressed a preference for applying through online channels, including websites and mobile applications, reflecting a broader shift toward digital finance (Ayadi & Shaban, 2020). This shift was partially driven by lockdown measures, but it also indicates an increasing user comfort with remote financial services. However, 25.6% of users still faced difficulties using these platforms, signaling the persistence of a digital divide rooted in factors such as poor internet connectivity, inadequate digital literacy, or lack of inclusive platform design (Kamal et al., 2025). These challenges have important implications for financial inclusion, as automation alone does not guarantee equal access unless supported by targeted efforts to bridge infrastructure and knowledge gaps.

Another major insight from the study relates to stakeholder concerns about regulatory and ethical implications. While automation was praised for improving processing speed and reducing paperwork, it also raised alarms about data privacy, security, and the exclusion of underserved groups. Financial institutions and regulators must recognize that algorithmic systems can perpetuate or even exacerbate biases if not carefully monitored (Bahangulu & Owusu-Berko, 2025). The absence of clear frameworks for ethical AI deployment in Nigeria's financial sector presents a risk that needs urgent attention.

Interestingly, the findings also suggest a strong belief in the future potential of automation. Over half of the respondents felt that automation would lead to greater efficiency and accessibility, and nearly an equal number expected it to reduce human bias in lending decisions. This indicates a level of trust in digital transformation, albeit tempered by the recognition of its current limitations. In reflecting on the role of data and automation during the COVID-19 crisis, it is evident that these tools offered critical advantages in managing scale, speed, and continuity. Yet, the promise of automation extends beyond emergency response. Its long-term impact on the Nigerian lending ecosystem will depend on how effectively stakeholders address its current shortcomings, particularly in fraud detection, system adaptability, and equitable access (Ayodeji, 2024). The integration of qualitative responses further supports this view, as many participants shared sentiments that automation brought convenience and timeliness but lacked personalization and fairness, especially for marginalized entrepreneurs unfamiliar with digital systems (Arevalo 2024). Ethical considerations also shaped this study's approach. Informed consent was obtained from all participants, and anonymity was maintained to protect respondent identities (Kang & Hwang, 2021). Data was handled in compliance with digital research standards, ensuring confidentiality and respect for participant perspectives. While the study made significant progress in mapping the contours of automation's impact, its limitations include a reliance on self-reported data, which may be subject to respondent bias, and the exclusion of non-digitally literate populations who may not have been able to complete the survey.

The discussion underscores that automation transformed small business lending during the COVID-19 pandemic in Nigeria by increasing operational efficiency, expanding access through digital platforms, and stimulating interest in predictive technologies (Akpan et al., 2022). However, its full potential remains contingent on the resolution of infrastructural, regulatory, and ethical challenges that continue to shape the digital lending landscape.

Implications to Research and Practice

The findings of this study carry important implications for both academic research and practical applications in the financial services industry. On the research front, this study contributes significantly to the growing body of empirical work surrounding digital transformation, particularly within the context of emerging economies (Michael & Obahiagbon, 2025). By applying the Diffusion of Innovation Theory and Structural Contingency Theory, the research offers a conceptual foundation for understanding how financial institutions in Nigeria adopted automation to meet the demands of a crisis (Rogers et al. 2014). It enriches theoretical discourse by demonstrating that while automation can be rapidly deployed in response to external shocks, its efficacy is contingent upon the maturity of the institutional ecosystem and the alignment between technology, user capabilities, and regulatory frameworks.

Moreover, the integration of qualitative user experiences with quantitative survey data provides a methodological template that future scholars can replicate or expand (Clampitt 2009; Arevalo 2024). This mixed-method approach ensures that innovation in financial services is examined from both systemic and user-centric perspectives. The study also opens up new lines of inquiry, encouraging longitudinal research that explores how automated lending evolves and how it interacts with macroeconomic factors and institutional behavior. Comparative studies across different regions within sub-Saharan Africa would offer further insights into the scalability and sustainability of automated financial systems.

From a practical standpoint, the study highlights several operational and strategic implications for financial institutions, fintech startups, regulatory bodies, and policymakers. The research demonstrates that financial institutions which implemented automation during the COVID-19 pandemic were able to improve turnaround times for loan approvals and offer enhanced customer engagement (Chondough 2021) (Table 2 & 3). These gains in operational efficiency suggest that such institutions are better equipped for business continuity during crises (Fischbacher-Smith, 2017). There is a clear need for financial organizations to consolidate these innovations post-pandemic by enhancing scalability, improving integration across departments, and investing in real-time data processing systems.

Despite these gains, the findings also reveal persistent barriers to access among small business owners, particularly due to digital illiteracy, poor infrastructure, and the opacity of eligibility criteria. This underlines the importance of designing lending platforms that are not only technologically advanced but also inclusive, multilingual, and adaptable to diverse user needs and

technological environments (Akpan et al., 2022). The success of automation is inextricably linked to the ease with which users can navigate and engage with the system.

The study further reveals that while automation tools were in place, their effectiveness in fraud detection and compliance reporting was limited. This indicates a pressing need for financial institutions to explore advanced fraud detection mechanisms such as behavioral analytics and adaptive algorithms that provide real-time monitoring (Ediagbonya & Tioluwani, 2023). Automated compliance systems must also be expanded and refined to reduce regulatory burdens and ensure reporting accuracy, particularly for micro and small enterprise loan portfolios.

Ethical considerations also emerge prominently from the findings (Gabriel 2023). Data privacy concerns and the risk of algorithmic discrimination were reported by a significant proportion of respondents. These insights underscore the necessity for robust data governance frameworks and regulatory oversight to ensure that algorithmic decision-making is transparent, explainable, and fair. Ethical AI frameworks, developed in collaboration between regulators and financial institutions, can ensure that automation promotes equity rather than exacerbates existing inequalities.

The findings suggest that successful implementation of automation requires capacity building at multiple levels (Abikoye et al., 2024). Financial institutions must invest in the training of staff to manage, interpret, and monitor automated systems effectively. At the same time, small business owners and users of digital lending services need digital literacy programs that equip them with the skills required to navigate automated platforms confidently and securely. Government agencies and development partners can play a role in funding and facilitating such programs, especially in underserved regions.

The study provides insight that can guide policy development. For automation to realize its full potential in transforming small business lending, it must be supported by a robust national digital infrastructure (Nguyen 2024). Policies that promote broadband access, foster data sharing through open banking frameworks, and offer incentives for ethical digital innovation are essential. Regulatory bodies such as the Central Bank of Nigeria and the Nigeria Data Protection Commission should work closely with industry stakeholders to ensure that these systems are accountable, transparent, and inclusive.

In summary, the integration of data and automation into Nigeria's small business lending landscape has proven to be a powerful yet incomplete transformation. While the benefits are evident in terms of speed, reach, and resilience, challenges related to inclusion, ethics, infrastructure, and user engagement persist. By leveraging the insights from this study, both researchers and practitioners can better shape the future of digital finance in ways that are not only innovative but also sustainable and just.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study has examined the transformative impact of data and automation on small business lending in Nigeria during the COVID-19 pandemic. Drawing on both quantitative and qualitative evidence, including the analysis of 500 questionnaire responses and relevant literature, the research revealed that automated financial systems significantly enhanced loan processing efficiency, reduced manual workload, and enabled quicker disbursement of funds at a time when rapid intervention was critical.

A majority of respondents noted substantial improvements in loan turnaround time due to automation, and several automation tools, such as AI-driven underwriting, predictive analytics, and digital self-service dashboards, were identified as contributors to improved customer satisfaction and operational performance. However, these benefits were not evenly distributed across all aspects of the lending process. Respondents also pointed out persistent challenges, including approval delays, lack of clarity in eligibility requirements, and inefficiencies in loan restructuring. Furthermore, automated systems were perceived as less effective in areas such as fraud detection and compliance automation.

These mixed outcomes reinforce the study's theoretical underpinnings, specifically the Diffusion of Innovation Theory and Structural Contingency Theory. While the rapid adoption of automation reflected a natural response to environmental pressure during the pandemic, its uneven integration suggests that the systems were not fully adapted to organizational and infrastructural realities in Nigeria's financial sector. The findings confirm that the potential of automation to transform lending practices is significant, but its success depends on system alignment, ethical implementation, and capacity building across both institutions and end users.

In essence, the research concludes that automation played a pivotal role in enabling the financial services sector to withstand and adapt to the challenges of the COVID-19 crisis. However, the sustainability and inclusiveness of these solutions will depend on the continuous refinement of infrastructure, governance, and user engagement strategies.

Recommendations

Based on the insights gained, several key recommendations can be made. There is a critical need for investment in robust digital infrastructure, especially in underserved and rural areas, to ensure that automation can be deployed effectively and inclusively across the country. Financial institutions and digital service providers must focus on the development of automation tools that are not only technically advanced but also tailored to the needs and capabilities of small business owners, including those with low levels of digital literacy.

Additionally, more advanced and responsive fraud detection systems should be integrated into lending platforms, utilizing real-time data and adaptive algorithms. Compliance mechanisms should be streamlined through automated reporting tools that align with evolving regulatory requirements. The importance of ethical AI practices cannot be overstated; transparency in algorithmic decision-making and fairness in credit scoring must be actively enforced by regulatory bodies to prevent digital discrimination and build trust.

Another vital area for intervention is capacity building. Financial institutions should prioritize staff training to ensure that employees can interpret and manage the output of automated systems, while borrowers should be supported through financial literacy programs and digital onboarding assistance. Furthermore, open banking and safe data-sharing frameworks should be encouraged to expand access to reliable credit history and improve the accuracy of credit assessments.

Finally, the future deployment of automation should extend beyond loan approval and include functionalities for post-disbursement services, such as repayment monitoring and digital loan restructuring, especially during emergencies. Ongoing monitoring and longitudinal impact evaluations will also be necessary to measure the sustained effectiveness of automation in the evolving financial landscape of Nigeria.

REFERENCES

- Abikoye, B. E., Akinwunmi, T., Adelaja, A. O., Umeorah, S. C., & Ogunsuji, Y. M. (2024). Real-time financial monitoring systems: Enhancing risk management through continuous oversight. *GSC Advanced Research and Reviews*, 20(1), 465-76.
- Adevale, G. T., Analytics, D., Umavezi, J. U., & Olukoya, O. (2025). Innovations in Lending-Focused FinTech: Leveraging AI to Transform Credit Accessibility and Risk Assessment.
- Agarwal, P., Swami, S., & Malhotra, S. K. (2024). Artificial intelligence adoption in the post COVID-19 new-normal and role of smart technologies in transforming business: a review. *Journal of Science and Technology Policy Management*, 15(3), 506-529.
- Akpan, Ikpe Justice, Elijah Abasifreke Paul Udoh, and Bamidele Adebisi. "Small business awareness and adoption of state-of-the-art technologies in emerging and developing markets, and lessons from the COVID-19 pandemic." *Journal of Small Business & Entrepreneurship* 34, no. 2 (2022): 123-140.
- Amankwah-Amoah, J., Khan, Z., Wood, G., & Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of business research*, 136, 602-611.
- Arevalo, a. M. (2024). Preferred reporting items for systematic reviews and meta-analysis (prisma) in undergraduate research for bachelor of physical education programs. Available at ssn 5074617.
- Arinzeh, I. F. (2022). Microcredit Loan Accessibility and its Effect on the Performance of Small and Medium-sized Enterprises (SMEs) in the Niger Delta Region of Nigeria.
- Ayadi, R., & Shaban, M. (2020). Digital financial inclusion: a pillar of resilience amidst Covid-19. EMEA policy paper, 1-16.

- Ayodeji, I. A. (2024). *Fraud Detection and Prevention in the Nigerian Financial Industry* (Doctoral dissertation, Walden University)
- Bahangulu, J. K., & Owusu-Berko, L. (2025). Algorithmic bias, data ethics, and governance: Ensuring fairness, transparency, and compliance in AI-powered business analytics applications. *World J Adv Res Rev*, 1746-63.
- Bai, C., Quayson, M., & Sarkis, J. (2021). COVID-19 pandemic digitization lessons for sustainable development of micro-and small-enterprises. *Sustainable production and consumption*, 27, 1989-2001.
- Bello, O., & Ajao, A. O. (2024). Digital Literacy and Skills Development in Nigeria: Policies, Barriers and Recommendations. *Journal of African Innovation and Advanced Studies*.
- Castleberry, A., & Nolen, A. (2018). Thematic analysis of qualitative research data: Is it as easy as it sounds?. *Currents in pharmacy teaching and learning*, 10(6), 807-815.
- Chondough, S. M. (2021). Nigerian micro, small and medium enterprise (MSMEs)-impacts of Covid-19 on their operation and corporate social responsibility.
- Clampitt, P. G. (2009). The questionnaire approach. In *Auditing organizational communication* (pp. 55-77). Routledge.
- Cong, L. W., Yang, X., & Zhang, X. (2021). SMEs amidst the pandemic and reopening: Digital edge and transformation.
- Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank Publications.
- Ediagbonya, V., & Tioluwani, C. (2023). The role of fintech in driving financial inclusion in developing and emerging markets: issues, challenges and prospects. *Technological Sustainability*, 2(1), 100-119.
- Fischbacher-Smith, D. (2017). When organisational effectiveness fails: Business continuity management and the paradox of performance. *Journal of Organizational Effectiveness: People and Performance*, 4(1), 89-107.
- Gabriel, O. T. (2023). *Data privacy and ethical issues in collecting health care data using artificial intelligence among health workers* (Master's thesis, Center for Bioethics and Research).
- George, D., & Mallery, P. (2018). Descriptive statistics. In *IBM SPSS Statistics 25 Step by Step* (pp. 126-134). Routledge.
- Kamal, M., Rahmani, S., & Alam, M. R. (2025). *Beyond Traditional Banking: How Fintech is Reshaping Financial Access in India*. Available at SSRN 5122110.
- Kang, E., & Hwang, H. J. (2021). Ethical conducts in qualitative research methodology: Participant observation and interview process. *Journal of Research and Publication Ethics*, 2(2), 5-10.
- Michael, c. I., & obahiagbon, a. (2025). Fintech and economic growth in nigeria;: peer-to-peer lending, banking penetration and financial inclusion. *African banking and finance review journal*, 21(21), 19-39.
- Nalisa, B. A. (2022). *Impact of Coronavirus Pandemic on Small Businesses: A Qualitative Exploratory Case Study* (Doctoral dissertation, University of Phoenix).

- Nguyen, B. N. (2024). Developing an ethical framework for artificial intelligence management in the financial sector. *Journal of Economic and Banking Studies*, 4(8), 2.
- Odio, P. E., Kokogho, E., Olorunfemi, T. A., Nwaozomudoh, M. O., Adeniji, I. E., & Sobowale, A. (2021). Innovative financial solutions: A conceptual framework for expanding SME portfolios in Nigeria's banking sector. *International Journal of Multidisciplinary Research and Growth Evaluation*, 2(1), 495-507.
- Okegbola, O., & Akiotu, C. A. (2024). Regulatory Compliance. *Perspectives on Digital Transformation in Contemporary Business*, 269.
- Otokiti, B. O., Igwe, A. N., Ewim, C. P., Ibeh, A. I., & Sikhakhane-Nwokediegwu, Z. (2022). A framework for developing resilient business models for Nigerian SMEs in response to economic disruptions. *Int J Multidiscip Res Growth Eval*, 3(1), 647-659.
- Pennings, J. M. (2013). Structural contingency theory. In *A handbook of work and organizational psychology* (pp. 39-60). Psychology Press.
- Petighin, S. (2023). Policies aimed at enhancing financial inclusion during a pandemic: a literature review. *Economy and Sociology*, (2), 86-96.
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432-448). Routledge.
- Singh, D., Malik, G., & Bhatnagar, S. (Eds.). (2024). *Revolutionizing customer-centric banking through ICT*.
- Subramanyam, S. V. (2024). Transforming financial systems through robotic process automation and AI: The future of smart finance. *International Journal of Artificial Intelligence Research and Development (IJAIRD)*, 2(1), 203-223.
- Theodos, B., González-Hermoso, J., & Myczkowska, T. (2022). Leveraging Technology to Scale Up Small Business Lending.
- Tsamados, A., Aggarwal, N., Cowls, J., Morley, J., Roberts, H., Taddeo, M., & Floridi, L. (2021). The ethics of algorithms: key problems and solutions. *Ethics, governance, and policies in artificial intelligence*, 97-123.