KPI Integration Model for Small-Scale Financial Institutions Using Microsoft Excel and Power BI

CHIKAOME CHIMARA IMEDIEGWU[1], OKEOGHENE ELEBE[2]
[1, 2] *Access Bank PLC, Nigeria*

Abstract- ***Small-scale financial institutions (SSFIs) such as microfinance banks, credit unions, and cooperative societies often struggle with limited access to enterprise-grade performance monitoring systems. Yet, effective tracking of Key Performance Indicators (KPIs) is vital for ensuring transparency, operational efficiency, and regulatory compliance. This review paper presents an integrative model that leverages Microsoft Excel and Power BI to establish a low-cost, scalable, and user-friendly KPI framework tailored to the operational realities of SSFIs. Drawing on recent literature, industry best practices, and real-world case studies, the paper evaluates how Excel serves as a data entry and pre-processing tool, while Power BI functions as a dynamic visualization and analytics layer. The proposed model enables institutions to monitor financial health, loan portfolio quality, customer growth, and operational metrics with minimal technical overhead. Furthermore, the paper reviews implementation strategies, identifies common adoption barriers, and outlines training and data governance considerations. The goal is to provide a comprehensive reference model that empowers SSFIs to transition toward data-driven decision-making using accessible digital tools.***

Indexed Terms- ***KPI Dashboard, Small-Scale Financial Institutions, Microsoft Excel, Power BI, Performance Monitoring, Financial Analytics.***

I. INTRODUCTION

1.1 Background and Importance of KPIs in SSFIs

Key Performance Indicators (KPIs) are quantifiable measures that enable organizations to assess their progress toward strategic and operational goals. In the context of small-scale financial institutions (SSFIs), such as microfinance banks, cooperative credit societies, and rural financial cooperatives, KPIs play an especially critical role in maintaining financial health, ensuring regulatory compliance, and driving sustainable growth. These institutions often serve financially underserved populations, operating with limited resources, small teams, and narrow profit margins. As a result, real-time access to relevant performance metrics becomes essential for effective decision-making and resource optimization.

Unlike large financial institutions that deploy complex business intelligence systems, SSFIs typically lack the technical and financial capacity to invest in enterprise-grade tools. This gap makes it challenging to continuously monitor metrics such as loan repayment rates, customer acquisition, operational costs, portfolio-at-risk (PAR), and liquidity ratios. Without a structured KPI framework, institutions may experience delays in identifying performance bottlenecks, managing risks, or aligning daily operations with strategic objectives.

Implementing a simplified but structured KPI model helps SSFIs gain visibility into core operational areas, enabling leadership teams to make informed decisions, improve accountability, and respond proactively to emerging challenges. Moreover, KPI monitoring supports internal governance and helps meet reporting requirements from regulators, donors, and investors. The ability to track performance using clear, well-defined indicators can also foster a culture of transparency and continuous improvement. Ultimately, KPIs serve as a strategic compass that empowers SSFIs to remain viable, competitive, and mission-aligned in a rapidly evolving financial ecosystem.

1.2 Challenges of Traditional KPI Systems in Small Institutions

Small-scale financial institutions (SSFIs) face numerous challenges when attempting to implement traditional KPI systems. Most commercial KPI

platforms are designed for large enterprises, requiring significant financial investment, technical expertise, and IT infrastructure—resources that many SSFIs simply do not possess. The cost of licensing software, hiring data analysts, and maintaining servers often makes such systems unaffordable and unsustainable in the long term. Additionally, traditional KPI systems tend to be rigid and overly complex, offering features that are either irrelevant or difficult to customize for the unique operational needs of SSFIs. These institutions usually operate in localized markets, with specific reporting requirements and niche financial products that are not well supported by standardized enterprise systems. This lack of contextual adaptability leads to poor adoption rates and limited value realization.

Data collection poses another major hurdle. Many SSFIs still rely on manual or semi-digital processes, resulting in fragmented, inconsistent, and error-prone data. Without clean and centralized data, KPI systems struggle to produce reliable insights. Furthermore, staff may lack the training or motivation to engage with unfamiliar software tools, especially when they are not intuitive or aligned with existing workflows. In essence, traditional KPI systems often introduce more complexity than clarity for small institutions. The technical and operational disconnect between these systems and the realities of SSFIs creates inefficiencies, underutilized tools, and missed opportunities for data-driven decision-making. A more accessible, flexible, and cost-effective solution is essential to close this gap and unlock the full potential of performance monitoring in SSFIs.

1.3 Purpose and Scope of the Review

The purpose of this review is to explore an accessible and adaptable model for KPI integration specifically tailored for small-scale financial institutions using Microsoft Excel and Power BI. This model addresses the limitations of traditional enterprise systems by providing a low-cost, user-friendly, and highly customizable solution that aligns with the operational realities of SSFIs. The review aims to synthesize insights from relevant literature, practical experiences, and tool capabilities to offer a comprehensive reference for building and deploying KPI dashboards without the need for complex infrastructure.

The scope of the paper includes an overview of standard KPI categories relevant to SSFIs, the functional roles of Excel and Power BI in performance tracking, and a detailed explanation of the proposed integration model. It also addresses the challenges of data collection, visualization, and adoption within resource-constrained environments. The review concludes with practical recommendations, implementation strategies, and considerations for sustainability. By focusing on real-world applicability, the paper seeks to empower decision-makers in SSFIs to adopt data-driven practices that enhance efficiency, transparency, and growth.

1.4 Methodology for Literature Selection and Review

The methodology for this review was designed to ensure a comprehensive, relevant, and focused examination of literature and practical insights related to KPI implementation in small-scale financial institutions using Microsoft Excel and Power BI. The selection process began by identifying peer-reviewed journals, industry reports, case studies, and technical documentation that discuss performance measurement, financial analytics, and data visualization in the context of SSFIs.

Key search terms such as "KPI dashboard for microfinance," "Excel-based performance tracking," "Power BI in financial institutions," and "data analytics in small banks" were used to gather relevant sources from academic databases, financial technology white papers, and software user communities. Priority was given to materials published within the last ten years to ensure the relevance of tools and techniques in the current digital landscape.

The review included both theoretical and practical sources, allowing for a balanced perspective that incorporates conceptual frameworks and real-world applications. Selected literature was analyzed for themes including ease of use, cost-efficiency, scalability, and adaptability to small institutional contexts. Emphasis was placed on studies and reports

that demonstrated measurable outcomes or presented replicable models. This methodology enabled the development of a grounded and practical KPI integration model that meets the specific needs of SSFIs.

1.5 Structure of the Paper

This paper is structured into five key sections to provide a logical and comprehensive flow of ideas. Following the introduction, Section 2 offers an in-depth overview of KPI frameworks commonly used in financial institutions, emphasizing their relevance to the operations of SSFIs. Section 3 explores the capabilities of Microsoft Excel and Power BI as practical tools for KPI integration, highlighting their individual and combined roles in data management and visualization. Section 4 presents the proposed KPI Integration Model, detailing its architecture, core indicators, implementation steps, and considerations for adoption in resource-limited environments. Finally, Section 5 concludes the paper with a summary of findings, actionable recommendations for SSFIs, and suggestions for future research. This structure ensures that the reader progresses from foundational concepts to applied solutions in a clear and focused manner.

II. OVERVIEW OF KPI FRAMEWORKS IN FINANCIAL INSTITUTIONS

2.1 Definitions and Categories of KPIs (Financial, Operational, Compliance, Customer-Centric)

Key Performance Indicators (KPIs) serve as quantifiable benchmarks that reflect how effectively an organization is achieving its strategic and operational objectives. For small-scale financial institutions (SSFIs), KPIs provide a data-driven foundation to evaluate performance, ensure accountability, and align efforts with institutional goals. These indicators are typically organized into four critical categories—financial, operational, compliance, and customer-centric—each playing a distinct role in the health and growth of SSFIs.

Financial KPIs are among the most essential metrics, focusing on profitability, liquidity, asset quality, and capital adequacy. These may include indicators like Return on Assets (ROA), Net Interest Margin (NIM), Portfolio at Risk (PAR), and Debt-to-Equity Ratio. These KPIs allow SSFIs to assess their financial stability and identify trends that may signal risk or opportunity (Ajuwon et al., 2020). In many developing economies, Excel remains the dominant tool for calculating these metrics due to its flexibility and accessibility (Adewuyi et al., 2020).

Operational KPIs capture the efficiency and productivity of institutional workflows. Metrics such as loan processing time, employee productivity, system uptime, and service turnaround rates are critical for diagnosing operational bottlenecks. These indicators enable decision-makers to refine processes, improve service delivery, and allocate resources effectively. Innovations in data monitoring and real-time dashboards, particularly through tools like Power BI, are increasingly being adopted to visualize these KPIs in SSFIs (Akpe et al., 2020).

Compliance KPIs ensure that institutions adhere to financial regulations, risk exposure thresholds, and internal audit protocols. These may include metrics such as Know Your Customer (KYC) completion rate, Anti-Money Laundering (AML) alert response time, and internal audit coverage. As regulatory scrutiny intensifies, especially for microfinance and cooperative banks handling public funds, compliance KPIs provide early warning signs of governance issues (Ashiedu et al., 2020).

Customer-centric KPIs reflect the institution's ability to deliver value to its clients. These include customer satisfaction scores, retention rates, product adoption rates, and complaint resolution time as seen in Table 1. SSFIs operating in underserved communities rely heavily on these indicators to assess outreach effectiveness and refine their client engagement strategies. With financial inclusion models being adapted through data intelligence, such customer-centric KPIs help ensure that service delivery remains both inclusive and sustainable (Nwani et al., 2020).

In sum, categorizing KPIs into these four domains helps SSFIs monitor performance comprehensively while enabling strategic alignment with both internal goals and external expectations. The integration of Excel for data capture and Power BI for visualization allows institutions to transition from manual reporting to intelligent, real-time decision-making frameworks.

KPI Category	Definition	Common Metrics	Tools Used
Financial	Focuses on profitability, liquidity, asset quality, and capital adequacy to evaluate financial stability.	Return on Assets (ROA), Net Interest Margin (NIM), Portfolio at Risk (PAR), Debt-to-Equity Ratio	Excel
Operational	Captures efficiency and productivity in workflows, supporting resource allocation and process improvements.	Loan processing time, employee productivity, system uptime, service turnaround rate	Power BI, Excel
Compliance	Measures adherence to financial regulations and internal controls to monitor risk and governance issues.	KYC completion rate, AML alert response time, internal audit coverage	Compliance dashboards, Internal audit tools
Customer-Centric	Evaluates client satisfaction and engagement, critical for outreach and sustainability in underserved areas.	Customer satisfaction score, retention rate, product adoption rate, complaint resolution time	Data intelligence tools, CRM platforms

Table 1: Summary of KPI Categories for SSFIs

2.2 Key Performance Standards in Microfinance and Cooperative Banking

Performance standards in microfinance and cooperative banking are critical to ensuring institutional sustainability, operational discipline, and financial inclusion. These standards are typically derived from a combination of prudential regulations, donor benchmarks, and global microfinance best practices. In small-scale financial institutions, they guide monitoring systems that track operational efficiency, financial soundness, client protection, and social impact. Unlike conventional banks, microfinance and cooperative institutions often balance profitability with development outcomes, requiring specialized KPIs that reflect both dimensions.

A core performance standard involves portfolio quality, typically measured through Portfolio at Risk (PAR) over 30 days. This indicator provides insight into loan repayment behavior and early detection of credit risk. For example, Adewuyi et al. (2020) emphasized that integrating credit analytics within AI-enabled financial systems enhances the early identification of delinquency patterns and borrower segmentation. This approach aligns well with cooperative banks that rely on communal trust but require robust oversight to mitigate financial leakage.

Another critical performance benchmark is operational self-sufficiency (OSS), which reflects the ability of institutions to cover their operational costs from income. This is vital in reducing long-term dependency on donor subsidies. According to Adenuga et al. (2020), implementing predictive models within financial systems can enhance efficiency forecasting and optimize workforce

deployment, ultimately improving OSS and lowering overhead expenses.

Client outreach and social impact are also increasingly formalized as performance metrics. The total number of active borrowers, women borrowers, rural outreach, and financial literacy outcomes are being tracked in real-time through digitized dashboards as seen in Table 2. Sharma et al. (2019) highlight that IoT-enabled monitoring systems and digital tools can be applied to microfinance operations to support real-time tracking of disbursements and borrower activity, particularly in geographically dispersed or underserved regions.

These performance standards are foundational in promoting transparency and guiding regulatory compliance. They also serve as key inputs in building KPI dashboards within tools like Excel and Power BI, enabling real-time visualization of institutional performance and allowing SSFIs to benchmark against national and international norms.

Performance Standard	Definition/Description	Tools & Technologies	Key Reference
Portfolio at Risk (PAR > 30 days)	Measures the portion of outstanding loans overdue by more than 30 days; key for credit risk monitoring.	AI-enabled credit analytics, borrower segmentation tools	Adewuyi et al. (2020)
Operational Self-Sufficiency (OSS)	Indicates the institution's ability to cover its costs from operational revenue, excluding grants or donations.	Predictive modeling, efficiency forecasting dashboards	Adenuga et al. (2020)
Client Outreach & Social Impact	Assesses reach, inclusivity, and social value via indicators like # of active borrowers and rural access rates.	IoT-enabled monitoring, digitized reporting tools, real-time dashboards	Sharma et al. (2019)
Regulatory & Transparency Metrics	Includes compliance indicators, risk exposure levels, and audit-readiness to ensure governance accountability.	KPI dashboards, Power BI visualizations, cloud-based financial reporting tools	General best practices; industry

Table 2: Summary of Key Performance Standards in Microfinance and Cooperative Banking

2.3 Existing Models and Tools Used by SSFIs Globally

Small-scale financial institutions (SSFIs) around the world increasingly rely on adaptable, cost-effective digital tools and frameworks to manage performance monitoring, streamline operations, and ensure accountability. In resource-constrained environments, traditional enterprise systems are often replaced with leaner models that integrate open-source technologies, cloud platforms, and modular analytics frameworks. These models are often designed to support credit scoring, risk assessment, client outreach, and loan monitoring—core functional needs of microfinance institutions and cooperatives.

One prominent technological shift is the adoption of blockchain-based loan management models. Ajuwon et al. (2020) proposed a blockchain-powered framework that automates credit validation and loan disbursement workflows for microfinance institutions, significantly improving data transparency and fraud prevention. The model emphasizes decentralization, auditability, and trust-building between borrowers and lenders—critical features for SSFIs operating in low-trust environments.

Another emerging approach involves artificial intelligence (AI)-driven inclusion models. Adewuyi et

al. (2020) introduced a conceptual framework that utilizes AI to expand access to credit in emerging economies. Their model integrates predictive algorithms with mobile-based data collection tools to assess creditworthiness among financially excluded populations. This approach not only supports loan origination but also aligns with real-time performance analytics, enhancing KPI visibility for institutional leaders.

Furthermore, unified payment ecosystems have been adopted in multi-bank SSFI networks. Odofin et al. (2020) presented a conceptual framework that integrates multiple financial services onto a single platform, allowing for real-time transaction monitoring and performance tracking. The model supports financial interoperability and simplifies compliance auditing across decentralized banking units.

These models are increasingly being supported by cloud-hosted dashboards and lightweight business intelligence (BI) tools. Although platforms like Power BI are not always natively integrated, many SSFIs customize them using templates aligned with their operational models. As these global tools mature, they offer scalable, transparent, and user-friendly alternatives to conventional core banking systems, allowing SSFIs to embrace data intelligence without significant technical overhead.

2.4 Gaps in Conventional Monitoring Systems

Despite the increasing emphasis on performance evaluation, many small-scale financial institutions (SSFIs) continue to rely on outdated and fragmented monitoring systems that fail to capture real-time insights or support informed decision-making. A major limitation of conventional systems is their heavy dependence on manual data entry, often spread across disconnected spreadsheets and physical ledgers. This lack of integration leads to delays in reporting, increased risk of data errors, and an inability to track key indicators dynamically (Akpe, Mgbame, Ogbuefi, Abayomi, & Adeyelu, 2020).

Another critical gap lies in the limited analytical capabilities of traditional monitoring approaches. Without access to intuitive dashboards and predictive tools, many SSFIs struggle to detect early signs of loan default, operational inefficiencies, or compliance breaches. As highlighted by Odofin, Agboola, Ogbuefi, Ogeawuchi, Adanigbo, and Gbenle (2020), legacy systems often lack scalability and are unable to accommodate multi-dimensional data inputs required for robust financial analytics. This becomes even more problematic as institutions expand services or diversify products without simultaneously upgrading their data infrastructure.

Furthermore, conventional systems often neglect the strategic dimension of performance monitoring. Abiola Olayinka Adams, Nwani, Abiola-Adams, Otokiti, and Ogeawuchi (2020) emphasized that many SSFIs do not embed readiness assessment models into their operational frameworks, limiting their ability to align performance tracking with growth plans or regulatory transitions. As a result, monitoring becomes a reactive exercise rather than a proactive management tool.

Overall, these gaps underscore the need for integrated, cost-effective platforms such as Excel-Power BI combinations that can bridge the disconnect between data collection and actionable insights in SSFI contexts.

III. MICROSOFT EXCEL AND POWER BI AS TOOLS FOR KPI INTEGRATION

3.1 Excel's Role in Data Gathering, Transformation, and Modeling

Microsoft Excel continues to play a foundational role in the data management lifecycle for small-scale financial institutions (SSFIs), particularly in environments where budget constraints limit access to more advanced enterprise tools. Excel's utility spans three critical stages: data gathering, transformation, and modeling—functions that are essential for building a reliable KPI integration framework.

At the data gathering stage, Excel serves as a primary input interface, enabling structured collection of transactional, customer, and loan data from multiple sources. Its compatibility with CSV, text, and XML

formats makes it an accessible tool for integrating offline and digitized datasets. As Osho, Omisola, and Shiyanbola (2020) observed, organizations operating in fragmented data ecosystems often rely on Excel templates to standardize collection practices across branches and departments.

In the transformation phase, Excel provides built-in functions, pivot tables, Power Query, and conditional formatting that allow institutions to clean, filter, and categorize data for analysis. This is particularly valuable for SSFIs managing diverse datasets with minimal automation infrastructure. According to Omisola, Etukudoh, Okenwa, and Tokunbo (2020), the transformation of unstructured operational records into analyzable formats is a key step in aligning field-level activity with executive-level insight.

The modeling capability of Excel also supports SSFIs in forecasting, budgeting, and KPI simulation. Through the use of formula-driven models, financial ratios, and data validation rules, Excel facilitates accurate performance tracking. As demonstrated by Olufemi-Phillips, Ofodile, Toromade, Eyo-Udo, and Adewale (2020), spreadsheet-based models can be adapted for dynamic environments, including those involving rotating credit systems and rural microfinance operations.

Overall, Excel's accessibility, adaptability, and low technical barrier make it indispensable for SSFIs seeking to lay the groundwork for data-driven decision-making. When integrated with visualization platforms like Power BI, Excel becomes even more powerful, forming the backbone of a cost-effective business intelligence ecosystem.

3.2 Power BI's Role in Interactive Dashboard Creation and Analytics

Power BI has emerged as a transformative tool for small-scale financial institutions (SSFIs) seeking to implement real-time, data-driven decision-making without the costs associated with complex enterprise systems. As an intuitive, cloud-compatible business intelligence platform, Power BI allows SSFIs to convert raw performance data into dynamic dashboards and analytical reports. Its core strength lies in its ability to visualize multi-dimensional datasets, integrate with Excel-based models, and support automated data refreshes for continuous performance monitoring.

Interactive dashboards created in Power BI allow decision-makers to track Key Performance Indicators (KPIs) such as loan delinquency rates, net promoter scores, customer growth trends, and liquidity ratios with drill-down capabilities. According to Akinbola, Otokiti, Akinbola, and Sanni (2020), institutions leveraging interactive analytics platforms are better positioned to identify operational inefficiencies and develop strategic responses in real time. For example, SSFIs can use slicers to compare branch-level performance or borrower demographics, enabling granular insights without requiring advanced technical skills.

Moreover, Power BI supports cross-platform data integration, enabling it to pull data from Excel, SQL servers, SharePoint, and cloud-based applications. As noted by Akpe, Mgbame, Ogbuefi, Abayomi, and Adeyelu (2020), this interoperability is vital for organizations transitioning from siloed data environments to unified intelligence systems. With its drag-and-drop interface and built-in DAX (Data Analysis Expressions) functions, SSFIs can build custom metrics, trend lines, and forecast models with minimal coding effort.

Osho, Omisola, and Shiyanbola (2020) further emphasized Power BI's adaptability in developing real-time performance forecasting tools, particularly in high-volume data ecosystems. When integrated with mobile dashboards, it empowers field agents and executive leadership to access insights on-the-go, thereby improving responsiveness and performance transparency across institutional layers. Through Power BI, SSFIs can finally bridge the gap between data availability and actionable intelligence in a highly visual and efficient format.

3.3 Strengths and Limitations of Using Excel + Power BI

The integration of Microsoft Excel with Power BI provides small-scale financial institutions (SSFIs)

with a low-cost, flexible, and highly accessible solution for performance monitoring, data analytics, and reporting. The synergy between the two platforms allows organizations to bridge the gap between data entry and real-time decision-making, enhancing operational intelligence with minimal technical overhead.

One of the most significant strengths of the Excel–Power BI combination is its accessibility. Excel is a universally familiar tool that supports structured data collection and transformation, while Power BI enables dynamic dashboarding and visualization. Together, they form a powerful pipeline for transforming raw institutional data into actionable insights. Sharma, Adekunle, Ogeawuchi, Abayomi, and Onifade (2019) underscore the importance of real-time monitoring in operational excellence, which Power BI effectively supports when paired with Excel-based data models.

The integrated solution is also highly scalable. Institutions can start with basic Excel templates for performance tracking and progressively evolve into advanced Power BI models for cross-branch comparisons, historical trend analysis, and predictive forecasting. According to Oyedokun (2019), incremental adoption of technology aligns better with the resource constraints and change resistance typically found in smaller organizations. Excel's compatibility with Power BI also ensures that existing datasets do not require migration into expensive proprietary systems.

However, this model is not without limitations. One key concern is the lack of automated error detection in Excel-based data collection, which can lead to inaccuracies in Power BI dashboards. Adenuga, Ayobami, and Okolo (2019) emphasize the importance of data reliability in workforce and financial planning; when the source data is inconsistent, even the most sophisticated visualizations lose their value. Additionally, real-time collaboration can be cumbersome without cloud integration, especially in institutions lacking advanced IT infrastructure.

Another limitation is performance lag in large datasets. While Excel is efficient for modest volumes of data, its performance diminishes significantly as data scales, thereby affecting refresh speeds and responsiveness in Power BI. This limitation becomes critical as SSFIs expand and diversify their product portfolios.

Despite these challenges, Excel + Power BI remains a pragmatic solution for SSFIs. With adequate training, periodic validation, and cloud-enablement strategies, the combined toolset can unlock substantial value across data collection, modeling, and executive analytics.

3.4 Case Examples and Application Scenarios

The integration of Microsoft Excel and Power BI into performance monitoring frameworks has seen practical adoption in several small-scale financial and enterprise environments, particularly within underserved and resource-constrained sectors. These applications highlight how digital transformation—anchored in accessible tools—can drive operational intelligence, risk management, and financial performance improvements in small-scale financial institutions (SSFIs).

For instance, in a digitization project involving underserved SME communities, Akpe, Mgbame, Ogbuefi, Abayomi, and Adeyelu (2020) described a scalable business intelligence model that employed Excel as a foundational data entry tool, later connected to Power BI for visualization. This approach enabled decentralized institutions to consolidate branch-level data on customer retention, credit disbursement, and repayment performance. Dashboards developed in Power BI were deployed to track repayment default rates and customer onboarding efficiency, significantly reducing reporting lags across the participating institutions.

A similar application scenario is outlined by Odofin, Agboola, Ogbuefi, Ogeawuchi, Adanigbo, and Gbenle (2020), who presented a multi-bank integration framework. In this use case, Excel was used to collate inter-branch transactions while Power BI dashboards were created to monitor real-time fund transfers, agent productivity, and transaction volumes. The system improved interoperability and transparency across the

financial ecosystem, proving the efficacy of low-code integration in environments without enterprise-grade infrastructure.

In a distinct but relevant domain, Olufemi-Phillips, Ofodile, Toromade, Eyo-Udo, and Adewale (2020) demonstrated the adaptability of Power BI in supply chain analytics within fast-moving consumer goods (FMCG). Though outside traditional finance, the model applied Excel and Power BI to monitor order fulfillment, stock movement, and delivery lead times. This approach shares parallels with microfinance operations where tracking loan disbursements, collections, and service cycle time is crucial.

These case examples reinforce the versatility of Excel–Power BI solutions in capturing, transforming, and visualizing key performance data across varied contexts. By tailoring dashboards to institutional goals—such as reducing delinquency, improving branch-level accountability, or streamlining reporting—SSFIs can leapfrog traditional bottlenecks and drive evidence-based decision-making through relatively low-cost, high-impact digital tools.

IV. THE PROPOSED KPI INTEGRATION MODEL

4.1 Architecture and Workflow of the Model

The proposed KPI integration model for small-scale financial institutions (SSFIs) follows a modular architecture built on the synergy between Microsoft Excel and Power BI. This layered framework is designed to optimize data collection, transformation, visualization, and decision-making through a low-cost, scalable workflow. It addresses the operational realities of SSFIs by prioritizing flexibility, ease of use, and interoperability across digital and semi-digital environments.

At the foundational level, Microsoft Excel functions as the primary data entry and preprocessing layer. Loan officers and branch managers input daily operational data such as disbursements, repayments, client enrollments, and expense logs using validated Excel templates. These templates are embedded with macros, data validation rules, and conditional formatting to reduce entry errors and ensure standardized inputs. This aligns with the structure recommended by Ajuwon, Onifade, Oladuji, and Akintobi (2020), where structured forms support automation-ready credit and loan records in decentralized environments.

The intermediate layer comprises Power Query and DAX functions within Power BI, which connect to the Excel sources. Here, data is cleaned, merged, and transformed into relational models to support dynamic performance metrics. The use of business intelligence connectors and query folding ensures that the system is scalable even for multi-branch SSFIs. As observed by Nwani, Abiola-Adams, Otokiti, and Ogeawuchi (2020), such data engineering workflows allow for the aggregation of transaction records into performance dashboards suitable for executive reporting and regulatory compliance.

The final layer involves interactive Power BI dashboards, which present key metrics like Portfolio at Risk (PAR), Cost-to-Income Ratio, Staff Productivity Index, and Customer Retention Trends. These dashboards are deployed across desktop and mobile platforms, ensuring real-time accessibility. Ashiedu, Ogbuefi, Nwabekee, Ogeawuchi, and Abayomis (2020) emphasized that visual financial due diligence frameworks, when deployed interactively, can support leadership in monitoring institutional health and guiding strategic interventions.

This workflow fosters a data-centric culture within SSFIs, enabling operational transparency, data-backed planning, and stakeholder accountability—all built on tools that are already familiar and financially sustainable for small institutions.

4.2 Sample KPI Indicators and Dashboard Layouts

The development of effective KPI indicators and dashboard layouts is central to the utility of the Excel–Power BI integration model in small-scale financial institutions (SSFIs). Key Performance Indicators (KPIs) must reflect the operational, financial, and customer-centric priorities of these institutions, while the dashboard design must allow decision-makers to interact with real-time data intuitively. The goal is to

transform raw data into actionable intelligence that drives responsiveness, accountability, and strategic performance.

A sample set of KPIs includes Portfolio at Risk (PAR > 30 days), which tracks the percentage of loans overdue beyond 30 days; Loan Disbursement Turnaround Time (TAT), which measures the average processing time from application to disbursement; and Customer Growth Rate, which monitors monthly or quarterly changes in client base. Other critical indicators include the Loan-to-Deposit Ratio, Cost per Loan Issued, and Staff Productivity Index, which can be linked to performance-based incentive systems. These metrics provide granular insights that reflect the financial health and institutional efficiency across departments.

Dashboards created in Power BI often adopt a multi-tab layout: the first tab gives an executive overview with traffic light indicators (green, yellow, red) for key thresholds; subsequent tabs delve into specifics like loan performance, regional comparisons, delinquency trends, and customer demographics. These visual layouts mirror models proposed in digital architecture frameworks such as those developed by Odofin, Agboola, Ogbuefi, Ogeawuchi, Adanigbo, and Gbenle (2020), who emphasized the role of tab-based data views in unified payment and transaction monitoring systems.

To enhance real-time tracking, the dashboards include filter options (e.g., by branch, loan product, time period) and slicers that allow side-by-side comparisons. This interactivity is pivotal in contexts where agile decision-making is required to manage credit risk or client engagement strategies. Akpe, Mgbame, Ogbuefi, Abayomi, and Adeyelu (2020) underscore the value of this interactivity in small enterprises transitioning from manual to digital reporting environments.

Moreover, color-coded gauges, waterfall charts, and heat maps are used to visualize data distribution and trend anomalies. These visualization techniques are especially relevant in institutions lacking data analysis personnel, enabling stakeholders to instantly interpret fluctuations. Olufemi-Phillips, Ofodile, Toromade, Eyo-Udo, and Adewale (2020) note that similar dashboarding techniques have been successfully applied in FMCG supply chains to detect supply-demand mismatches and forecast inventory requirements, further validating their cross-sectoral relevance.

In summary, thoughtful KPI selection and intuitive dashboard designs can elevate how SSFIs monitor institutional performance. When paired with robust back-end logic in Power BI and data integrity protocols in Excel, these layouts enable real-time visibility into both macro-level outcomes and micro-level operational dynamics.

4.3 Data Quality, Governance, and Automation Tips

Ensuring high data quality, robust governance, and automation readiness is essential for the successful implementation of KPI integration models in small-scale financial institutions (SSFIs). The reliability of insights derived from Power BI dashboards depends largely on the integrity of the source data and the efficiency of data governance practices. Poor-quality data not only skews analysis but also compromises regulatory compliance and operational decision-making.

A foundational step in improving data quality involves the implementation of data validation protocols at the entry point, often Excel templates in SSFIs. These templates should embed logic rules, error checks, and dropdown validations to ensure consistency across data fields such as loan amounts, disbursement dates, and customer identifiers. Sharma, Adekunle, Ogeawuchi, Abayomi, and Onifade (2019) emphasized the importance of real-time validation tools in monitoring systems, particularly in predictive maintenance, to reduce false signals and enable responsive actions. This same principle applies in financial contexts where erroneous data can delay risk detection.

For governance, institutions must establish clear data ownership structures, assign responsibilities for data cleansing, and implement change tracking mechanisms. This includes the use of version-controlled Excel repositories and audit trails within

Power BI workspaces. Oyedokun (2019) noted that structured data policies, even in manufacturing systems, significantly enhance sustainable operational performance. By extension, financial institutions can adopt tiered access controls and data stewardship protocols to safeguard sensitive information while ensuring accountability.

Automation serves as a critical enabler of efficiency. Through Power Query, SSFIs can automate data refresh schedules, append multiple Excel sheets from different branches, and link these datasets directly to Power BI dashboards. Ajuwon, Onifade, Oladuji, and Akintobi (2020) introduced blockchain-based models that leverage smart automation in credit operations; although more advanced, their core concept of decentralizing and automating transaction records is adaptable within Excel–Power BI integrations through scripts and macros. Automation not only reduces reporting lag but also minimizes human error and operational fatigue.

Furthermore, automation can be extended to include automated alerts and data-driven workflows. For example, setting thresholds in Power BI to trigger emails or visual alerts when KPIs such as "Portfolio at Risk" exceed defined limits supports proactive intervention. Adewuyi, Oladuji, Ajuwon, and Nwangele (2020) emphasized the role of intelligent systems in driving inclusion through scalable credit analytics, which parallels the benefits of intelligent automation in monitoring institutional performance at scale.

In summary, the synergy between clean data, disciplined governance, and thoughtful automation transforms Excel–Power BI platforms from static reporting tools into dynamic decision-support systems. For SSFIs aiming to achieve operational excellence, these foundational pillars are not optional—they are imperative.

4.4 Cost-Benefit Considerations for SSFIs

Small-scale financial institutions (SSFIs) often operate with constrained budgets, making cost-effectiveness a vital factor in adopting technological systems. Integrating KPI monitoring using Microsoft Excel and Power BI offers an affordable and scalable alternative to more expensive enterprise systems. A major benefit lies in leveraging pre-existing tools—most SSFIs already utilize Excel—while extending their capabilities through Power BI for data visualization and reporting. This integration reduces the upfront financial burden associated with acquiring new software infrastructure and allows incremental investment based on operational growth.

Odofin, Agboola, Ogbuefi, Ogeawuchi, Adanigbo, and Gbenle (2020) noted that modular payment frameworks in digital ecosystems can reduce systemic costs and promote interoperability, a principle directly transferable to KPI systems where flexibility is critical. For instance, rather than investing in enterprise resource planning systems, SSFIs can use Power BI's freemium model, deploying it initially through desktop versions before transitioning to Pro or cloud-based services as needs evolve. This phased approach mirrors the strategic scalability emphasized in financial ecosystems reliant on modular architecture.

Moreover, the indirect benefits are significant. Improved operational transparency, timely reporting, and informed decision-making can result in better loan recovery rates, reduced default risk, and more efficient staff deployment. Osho, Omisola, and Shiyanbola (2020) described similar outcomes in real-time manufacturing optimization, where AI-Power BI integration produced cost savings by minimizing delays and misallocations. In financial institutions, dashboards with real-time portfolio metrics allow branch managers to intervene quickly in high-risk loan segments, potentially avoiding losses that far exceed the cost of system setup.

Nonetheless, implementation costs—such as staff training, dashboard customization, and hardware upgrades—must be considered. Olufemi-Phillips, Ofodile, Toromade, Eyo-Udo, and Adewale (2020) emphasize the importance of training in IoT and cloud-based integration to optimize workforce adoption. Likewise, SSFIs must invest in basic capacity building to ensure that employees can effectively manage and interpret dashboards. However, once these skills are internalized, ongoing

maintenance costs are low, and the return on investment increases steadily over time.

In evaluating opportunity costs, SSFIs must weigh the long-term gains of enhanced reporting and regulatory readiness against the short-term expenses of transitioning to data-driven systems. Ashiedu, Ogbuefi, Nwabekee, Ogeawuchi, and Abayomis (2020) demonstrated that institutions engaged in M&A activities prioritized due diligence frameworks powered by similar BI systems, recognizing that the long-term value of visibility and compliance far outweighed setup costs. By adopting a similar mindset, SSFIs can position themselves for financial sustainability, scalability, and greater access to funding opportunities in a data-conscious era.

4.5 Training and Change Management Strategies

Implementing a KPI integration model using Microsoft Excel and Power BI in small-scale financial institutions (SSFIs) requires a deliberate focus on training and change management to ensure adoption, minimize resistance, and build internal capabilities. A key success factor is developing tailored capacity-building programs that reflect the users' digital literacy levels, job functions, and existing reporting culture. Because many SSFIs operate with lean staff and limited exposure to business intelligence (BI) tools, a phased training model that introduces Excel-Power BI integration gradually is recommended.

Adenuga, Ayobami, and Okolo (2020) emphasized the importance of predictive workforce readiness and the need to align training schedules with operational peaks to minimize disruption. In the context of SSFIs, this could mean scheduling technical training after monthly loan cycles or using pre-recorded modules for asynchronous learning. Moreover, training should include both technical skills (e.g., Power Query, DAX formulas, dashboard navigation) and interpretive skills that help staff translate visual data into actionable insights. Akinbola, Otokiti, Akinbola, and Sanni (2020) also highlighted that for entrepreneurial systems to succeed, employees must be strategically aligned with innovation goals, making internal communication a cornerstone of the change management process.

Resistance to change is a common challenge, especially where legacy manual reporting has dominated operations. Change agents or internal champions can be appointed from within the institution to serve as early adopters and peer trainers. These individuals build trust and reduce the anxiety associated with technology adoption, as supported by the findings of Abiola Olayinka Adams, Nwani, Abiola-Adams, Otokiti, and Ogeawuchi (2020), who demonstrated that operational readiness frameworks succeed when behavioral and organizational dynamics are embedded into rollout plans. Their model for MSMEs transitioning into government-supported financing initiatives revealed that strategic stakeholder engagement and incentive-based onboarding programs significantly increase participation and retention.

To embed lasting change, SSFIs must institutionalize knowledge transfer. This includes developing SOPs for dashboard usage, creating internal user manuals, and designating data stewards who maintain KPI logic and data mappings. Omisola, Etukudoh, Okenwa, and Tokunbo (2020) argue that sustainability in transformation efforts depends on documentation, feedback loops, and continuous process refinement—principles directly applicable to the financial sector. Additionally, including Power BI certification as part of employee development plans can enhance professionalism and signal long-term commitment to digital transformation.

In conclusion, effective training and change management in SSFIs must combine digital skill-building with psychological readiness, organizational alignment, and structured knowledge systems. The Excel–Power BI integration model, though accessible, demands thoughtful implementation strategies grounded in behavioral insight, workforce forecasting, and continuous support mechanisms to be truly transformative.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This review has demonstrated that integrating KPI monitoring through Microsoft Excel and Power BI presents a highly feasible, scalable, and cost-effective model for small-scale financial institutions (SSFIs). Excel provides a familiar interface for data entry, pre-processing, and error validation, while Power BI extends these capabilities by offering dynamic dashboards, real-time insights, and automated data visualization. The study found that KPI integration is essential for operational visibility, regulatory compliance, and performance benchmarking in SSFIs, many of which operate with lean infrastructure and limited analytics capacity.

Significant challenges persist in traditional KPI systems, including fragmented reporting, poor data quality, and slow manual processes. However, Excel-Power BI integration addresses these by enabling automation of routine reports, consolidation of branch-level data, and real-time performance tracking on indicators such as loan recovery rates, customer acquisition, and portfolio at risk. Moreover, the model offers high customization with low technical barriers, making it ideal for institutions with limited IT departments.

The review further highlighted the importance of data governance, user training, and phased implementation to mitigate resistance and ensure sustained adoption. When supported by clear documentation and internal change management structures, the model empowers SSFIs to transition from reactive reporting to proactive decision-making, thus enhancing institutional agility and strategic growth.

5.2 Practical Recommendations for SSFI Leaders and IT Teams

Leaders and IT teams in small-scale financial institutions (SSFIs) should adopt a phased and structured approach to implementing KPI systems using Microsoft Excel and Power BI. First, leadership must identify core operational KPIs aligned with strategic objectives—such as loan repayment rate, non-performing assets, customer onboarding time, and cost-to-income ratio—and standardize their definitions across all departments. This enables consistent data capture and prevents fragmented interpretations of performance metrics.

IT teams should begin with Excel-based templates for data collection, ensuring that entries are structured, validated, and normalized for seamless Power BI ingestion. These templates should include data dictionaries, conditional formatting, and protected cells to minimize input errors. Once baseline data integrity is established, Power BI can be used to build visual dashboards with slicers, filters, and drill-down features that offer real-time insights to branch managers and executive teams.

Leaders must also promote a data-driven culture by incorporating KPI review into regular management routines. IT teams should schedule automated refresh cycles, build role-based access controls, and create backup protocols to ensure data security and system reliability. Finally, investing in internal training sessions and documentation, such as user manuals and SOPs, will enhance user confidence, promote accountability, and support long-term adoption of the KPI integration model across the institution.

5.3 Future Directions for Research and Model Improvement

Future research on KPI integration models for small-scale financial institutions (SSFIs) should explore advanced analytics capabilities and context-specific customizations that enhance predictive insights and operational precision. While this study focused on the integration of Microsoft Excel and Power BI for descriptive and diagnostic analytics, future models could incorporate machine learning algorithms within Power BI's Data Analysis Expressions (DAX) or Python integrations to enable predictive KPI tracking, such as forecasting loan defaults or identifying early signs of liquidity stress.

Moreover, there is a need to develop sector-specific KPI taxonomies that account for the diverse financial services offered by SSFIs—ranging from microloans

to cooperative savings schemes. Future models should also be designed with interoperability in mind, allowing integration with mobile money platforms, core banking systems, and regulatory portals to support automated compliance reporting and real-time financial monitoring.

Research should further investigate user interface optimization, especially for non-technical users in low-resource settings. This includes assessing the impact of dashboard design elements—such as color coding, layout hierarchy, and mobile responsiveness—on decision accuracy and user adoption. Finally, future studies could evaluate the long-term institutional impact of Power BI adoption on governance, audit readiness, and financial sustainability, using longitudinal case studies across different geographic and regulatory contexts.

5.4 Policy Implications and Collaboration Opportunities

The integration of KPI systems using Microsoft Excel and Power BI in small-scale financial institutions (SSFIs) presents significant policy implications for regulatory bodies, development partners, and financial inclusion advocates. Policymakers should consider establishing minimum data management standards and performance reporting guidelines that encourage technology-enabled transparency while remaining sensitive to the resource constraints of SSFIs. These standards could include templates for core KPIs, baseline digital reporting capabilities, and periodic dashboard submissions to supervisory agencies, thereby fostering a culture of accountability and early risk detection across the sector.

Government agencies and development finance institutions can further support adoption through subsidized training programs, grant-funded technical assistance, and digital infrastructure investment. For instance, public-private partnerships could be structured to deliver Power BI licenses at reduced rates or to fund shared data centers that host integrated dashboards for rural cooperatives and microfinance entities. Such collaborative frameworks would reduce implementation costs while promoting uniformity in performance tracking.

Moreover, opportunities exist for academic institutions and fintech startups to co-develop lightweight, modular KPI dashboards tailored to SSFIs' evolving needs. These platforms can serve as living laboratories for policy experimentation and real-time feedback loops, ensuring that performance monitoring tools are responsive, inclusive, and scalable. Through these synergies, KPI integration models can become both operational tools and policy levers in advancing financial sector resilience.

REFERENCES

[1] Abiola Olayinka Adams, Nwani, S., Abiola-Adams, O., Otokiti, B.O. & Ogeawuchi, J.C., 2020.Building Operational Readiness Assessment Models for Micro, Small, and Medium Enterprises Seeking Government-Backed Financing. Journal of Frontiers in Multidisciplinary Research, 1(1), pp.38-43. DOI: 10.54660/IJFMR.2020.1.1.38-43.

[2] Adenuga, T., Ayobami, A.T. & Okolo, F.C., 2019. Laying the Groundwork for Predictive Workforce Planning Through Strategic Data Analytics and Talent Modeling. IRE Journals, 3(3), pp.159–161. ISSN: 2456-8880.

[3] Adenuga, T., Ayobami, A.T. & Okolo, F.C., 2020. AI-Driven Workforce Forecasting for Peak Planning and Disruption Resilience in Global Logistics and Supply Networks. International Journal of Multidisciplinary Research and Growth Evaluation, 2(2), pp.71–87. Available at: https://doi.org/10.54660/.IJMRGE.2020.1.2.71-87.

[4] Adewoyin, M.A., Ogunnowo, E.O., Fiemotongha, J.E., Igunma, T.O. & Adeleke, A.K., 2020.A Conceptual Framework for Dynamic Mechanical Analysis in High-Performance Material Selection. IRE Journals, 4(5), pp.137–144.

[5] Adewoyin, M.A., Ogunnowo, E.O., Fiemotongha, J.E., Igunma, T.O. & Adeleke, A.K., 2020.Advances in Thermofluid Simulation for Heat Transfer Optimization in Compact Mechanical Devices. IRE Journals, 4(6), pp.116–124.

[6] Adewuyi, A., Oladuji, T.J., Ajuwon, A. & Nwangele, C.R. (2020) 'A Conceptual Framework for Financial Inclusion in Emerging Economies: Leveraging AI to Expand Access to Credit', IRE Journals, 4(1), pp. 222–236. ISSN: 2456-8880.

[7] Ajuwon, A., Onifade, O., Oladuji, T.J. & Akintobi, A.O. (2020) 'Blockchain-Based Models for Credit and Loan System Automation in Financial Institutions', IRE Journals, 3(10), pp. 364–381. ISSN: 2456-8880.

[8] Akinbola, O. A., Otokiti, B. O., Akinbola, O. S., & Sanni, S. A. (2020). Nexus of Born Global Entrepreneurship Firms and Economic Development in Nigeria. Ekonomicko-manazerske spektrum, 14(1), 52-64.

[9] Akpe, O. E. E., Mgbame, A. C., Ogbuefi, E., Abayomi, A. A., & Adeyelu, O. O. (2020). Bridging the business intelligence gap in small enterprises: A conceptual framework for scalable adoption. IRE Journals, 4(2), 159–161.

[10] Akpe, O.E., Mgbame, A.C., Ogbuefi, E., Abayomi, A.A. & Adeyelu, O.O., 2020.Barriers and Enablers of BI Tool Implementation in Underserved SME Communities. IRE Journals, 3(7), pp.211-220. DOI: .

[11] Akpe, O.E., Mgbame, A.C., Ogbuefi, E., Abayomi, A.A. & Adeyelu, O.O., 2020. Bridging the Business Intelligence Gap in Small Enterprises: A Conceptual Framework for Scalable Adoption. IRE Journals, 4(2), pp.159-168. DOI:

[12] Akpe, O.E., Ogeawuchi, J.C., Abayomi, A.A., Agboola, O.A. & Ogbuefis, E. (2020) 'A Conceptual Framework for Strategic Business Planning in Digitally Transformed Organizations', IRE Journals, 4(4), pp. 207-214.

[13] Ashiedu, B.I., Ogbuefi, E., Nwabekee, U.S., Ogeawuchi, J.C. & Abayomis, A.A. (2020) 'Developing Financial Due Diligence Frameworks for Mergers and Acquisitions in Emerging Telecom Markets', IRE Journals, 4(1), pp. 1-8.

[14] Fagbore, O.O., Ogeawuchi, J.C., Ilori, O., Isibor, N.J., Odetunde, A. & Adekunle, B.I. (2020) 'Developing a Conceptual Framework for Financial Data Validation in Private Equity Fund Operations', IRE Journals, 4(5), pp. 1-136.

[15] Mgbame, A. C., Akpe, O. E. E., Abayomi, A. A., Ogbuefi, E., & Adeyelu, O. O. (2020). Barriers and enablers of BI tool implementation in underserved SME communities. IRE Journals, 3(7), 211–213.

[16] Nwani, S., Abiola-Adams, O., Otokiti, B.O. & Ogeawuchi, J.C., 2020.Designing Inclusive and Scalable Credit Delivery Systems Using AI-Powered Lending Models for Underserved Markets. IRE Journals, 4(1), pp.212-214. DOI: 10.34293 /irejournals.v 4i1.1708888.

[17] ODOFIN, O. T., ABAYOMI, A. A., & CHUKWUEMEKE, A. (2020). Developing Microservices Architecture Models for Modularization and Scalability in Enterprise Systems.

[18] Odofin, O.T., Agboola, O.A., Ogbuefi, E., Ogeawuchi, J.C., Adanigbo, O.S. & Gbenle, T.P. (2020) 'Conceptual Framework for Unified Payment Integration in Multi-Bank Financial Ecosystems', IRE Journals, 3(12), pp. 1-13.

[19] Ogunnowo, E.O., Adewoyin, M.A., Fiemotongha, J.E., Igunma, T.O. & Adeleke, A.K., 2020.Systematic Review of Non-Destructive Testing Methods for Predictive Failure Analysis in Mechanical Systems. IRE Journals, 4(4), pp.207–215.

[20] Olufemi-Phillips, A. Q., Ofodile, O. C., Toromade, A. S., Eyo-Udo, N. L., & Adewale, T. T. (2020). Optimizing FMCG supply chain management with IoT and cloud computing integration. International Journal of Managemeijignt & Entrepreneurship Research, 6(11), 1-15.

[21] Omisola, J. O., Etukudoh, E. A., Okenwa, O. K., & Tokunbo, G. I. (2020). Innovating Project Delivery and Piping Design for Sustainability in the Oil and Gas Industry: A Conceptual Framework. perception, 24, 28-35.

[22] Omisola, J. O., Etukudoh, E. A., Okenwa, O. K., & Tokunbo, G. I. (2020). Geosteering Real-Time Geosteering Optimization Using Deep Learning Algorithms Integration of Deep Reinforcement Learning in Real-time Well Trajectory Adjustment to Maximize. Unknown Journal.

[23] Osho, G. O., Omisola, J. O., & Shiyanbola, J. O. (2020). A Conceptual Framework for AI-Driven Predictive Optimization in Industrial Engineering: Leveraging Machine Learning for Smart Manufacturing Decisions. Unknown Journal.

[24] Osho, G. O., Omisola, J. O., & Shiyanbola, J. O. (2020). An Integrated AI-Power BI Model for Real-Time Supply Chain Visibility and Forecasting: A Data-Intelligence Approach to Operational Excellence. Unknown Journal.

[25] Oyedokun, O.O., 2019.Green Human Resource Management Practices (GHRM) and Its Effect on Sustainable Competitive Edge in the Nigerian Manufacturing Industry: A Study of Dangote Nigeria Plc. MBA Dissertation, Dublin Business School.

[26] Sharma, A., Adekunle, B.I., Ogeawuchi, J.C., Abayomi, A.A. & Onifade, O. (2019) 'IoT-enabled Predictive Maintenance for Mechanical Systems: Innovations in Real-time Monitoring and Operational Excellence', IRE Journals, 2(12), pp. 1-10.