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DIGITAL TRANSFORMATION AND PROCESS AUTOMATION FOR SME OPERATIONAL EFFICIENCY

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2. ABSTRACT

Small and medium enterprises (SMEs) can automate routine work, but the effect depends on the condition of their records, the design of the workflow and the staff who operate it. This structured narrative review examines how Zambian SMEs can identify a suitable process, test automation and evaluate operational performance. It integrates national survey evidence, research on enterprise technology use and management practices, and guidance on process redesign and cybersecurity. In Zambia's 2022 enterprise finance survey, 28.0% of micro, small and medium enterprises reported keeping financial records. Among enterprises that kept records, 87.4% reported using a ledger or book and 2.1% reported using specialised software. International studies link technology use to complementary capabilities and show why management practices should be considered when interpreting productivity outcomes. The review proposes a six-stage implementation framework and defines indicators for processing time, accuracy, fulfilment and cost. It distinguishes routine automation from exception handling and explains how a pilot can compare performance under similar conditions. The resulting framework gives SMEs a basis for deciding whether to adapt, expand or stop a proposed change.

3. KEYWORDS: Process automation, digital transformation, small and medium enterprises, record keeping, operational efficiency, Zambia.

4. INTRODUCTION

A small retailer may enter a sale in a receipt book, update the stock balance on paper and record the transaction again in the accounts. Repeated entry takes time and creates opportunities for mismatches. A linked system could capture the sale once and update several records. The

change still depends on how the firm assigns product codes, deals with credit and returns, and checks discrepancies against the original transaction.

Digitisation makes information available in a digital form. Automation uses defined rules to complete selected steps, such as issuing an invoice or generating a replenishment alert. Digital transformation involves broader changes to how the business operates and creates value (Vial, 2019). A firm can digitise an inventory register before automating its use. It can measure each change against the particular problem it was intended to solve. Measuring technology at the level of business functions helps explain why firms use sophisticated tools for some tasks and manual methods for others (Cirera et al., 2022).

Adoption also depends on resources, skills and supporting services. The OECD's review identifies differences in digital adoption by firm size and by the complexity of the technology (OECD, 2021). Zambia's digital economy diagnostic identifies connectivity, capabilities and access to complementary services as conditions shaping uptake (World Bank, 2020). Those conditions affect whether firms can keep a digital process in regular operation, even when a particular tool is affordable at purchase.

This review asks which operational conditions support a useful automation pilot, how a firm can preserve essential controls, and which measures can show whether performance improves. Operational efficiency is defined as the time and resources needed to complete an eligible transaction at an agreed level of accuracy and service. The contribution is a workflow-level framework that connects business readiness to a decision based on measured results.

5. MATERIALS AND METHODS

A structured narrative review was used to integrate evidence on business practices, firm technology adoption, process design and evaluation. The approach follows Snyder (2019) in specifying the review question, source selection and synthesis procedure. Targeted searches of publisher records, institutional repositories and public reports were checked through 6 November 2026. Terms included SME digital transformation, process automation, business function technology adoption, record keeping in Zambia, small firm management practices and business process evaluation.

The review retained studies with an identifiable setting and outcome relevant to operational adoption or performance, and selected authoritative sources describing controls, evaluation methods or

the Zambian setting. It compared studies by business size, unit of analysis, definition of adoption and type of outcome. National survey data describe baseline practices. Cross-sectional studies identify relationships worth testing, and field experiments inform interpretation of management changes within their own settings. Sources were selected purposively and results were synthesised by theme. The proposed rollout and evaluation are applications for future local testing.

Figure 1 reproduces the total column of Figure 28 in Zambia's 2022 MSME Finance Survey Report. The survey's overall financial record keeping and the estimates by business formality were taken from Figures 25 and 27 (Zambia Statistics Agency & Bank of Zambia, n.d.). The recording-method graph uses enterprises that report keeping records as its denominator. Multiple methods can be reported, so the method shares are read individually.

6. RESULTS AND DISCUSSION

6.1 Record keeping and readiness in Zambia

The 2022 survey reported that 28.0% of micro, small and medium enterprises kept financial records. The reported shares were 77.2% among formal enterprises and 25.7% among informal enterprises (Zambia Statistics Agency & Bank of Zambia, n.d., Figures 25 and 27). These groups can differ in scale, sector and customer requirements as well as registration status. The difference describes the survey populations and does not identify an effect of formalisation.

Among enterprises keeping records, ledgers or books were by far the most commonly reported method. Use of general and specialised computer software was relatively uncommon in that group (Zambia Statistics Agency & Bank of Zambia, n.d., Figure 28). A local readiness assessment therefore needs to check how transactions are recorded and reconciled before deciding what can be automated. The national percentages are a historical baseline. A firm-level assessment is required to determine whether an individual enterprise has complete records, suitable equipment and staff able to maintain the workflow.

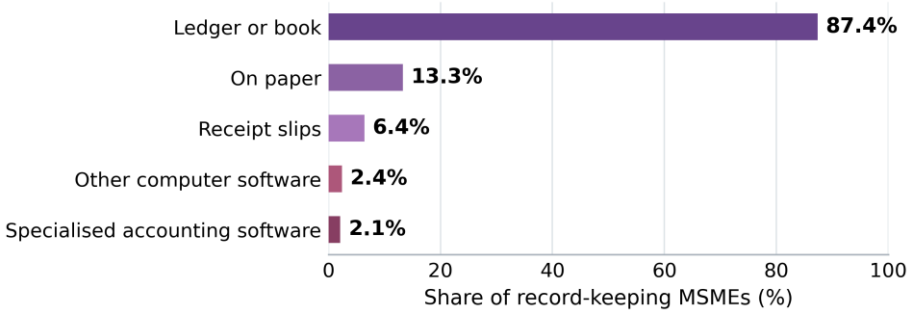

Figure 1. Record-keeping methods among Zambian enterprises that reported maintaining financial records (Zambia Statistics Agency & Bank of Zambia, n.d., Figure 28). Enterprises could report more than one method.

Research on small firms in developing countries links practices such as record keeping, stock control and financial planning to better performance and survival (McKenzie & Woodruff, 2017). The association gives a reason to improve the underlying routines before linking records through software. A firm that lacks a complete stock register may first need to establish opening balances and a consistent way to record movements. When those records can be checked against physical stock, the firm is in a better position to evaluate whether a digital process reduces rework.

6.2 Technology and complementary capabilities

In a survey of 193 SMEs, Eller et al. (2020) associated digitalisation with information technology resources, staff skills and a digital strategy. The study also linked digitalisation to financial performance. These relationships concern broad firm capabilities and outcomes. They help explain why a process pilot should record staff preparation and managerial support alongside the tool it uses. A successful firm may also be better placed to adopt technology, which limits causal interpretation of a survey association.

Bouwman et al. (2019) examined business model experimentation and implementation in European SMEs undergoing digitalisation. Their analysis supports assessing how firms test a change and use the results to revise their approach. Garzoni et al. (2020) describe several levels of engagement with digital technology, beginning with awareness and progressing through use and collaboration. These contributions suggest assessing a firm's readiness for a particular workflow. A simple ordering process can benefit from improved data capture even if another function still requires manual checks.

Evidence on management practices helps explain how changes in routines might affect results. In a randomised management intervention in large Indian textile firms, changes in production and inventory practices improved productivity (Bloom et al., 2013). A Colombian experiment compared individual and group-based management consulting in auto parts firms and documented improvements in management practices (Iacovone et al., 2022). Both interventions addressed management capability. Their findings give a rationale for training and follow-up in an automation pilot, while the benefit of a particular software change has to be measured in the firm using it.

Assess each workflow by its volume, data quality, exception rates and consequences of failure. Order entry and stock replenishment may use the same records but require different approvals and safeguards.

6.3 Workflow redesign and implementation

Process management starts with an agreed account of how work is done. Identify the event that starts a transaction, the people and systems involved, the decisions made and the evidence that the transaction was completed. Compare that account with what actually happens when stock is unavailable, a payment is reversed or a customer changes an order. The process lifecycle described by Dumas et al. (2018) links discovery, analysis, redesign and monitoring. That sequence allows an SME to address repeated work before embedding it in software.

Select rules that operate on stable inputs. A reorder alert may be useful when stock movements use a common identifier and inventory balances are reconciled. A purchase authorisation may still need review when volumes are unusual or supplier details have changed. Robotic process automation is one way to execute defined tasks across existing interfaces (van der Aalst et al., 2018). Interfaces, approval rules and data formats can change, so the firm needs a way to detect failures, restore records and handle exceptions.

Table 1. Proposed stages for an SME automation pilot.

Stage	Work to complete	Evidence needed for the next decision
1. Baseline	Select a repeated workflow with a material problem. Document its current records, time and errors.	A named process owner, eligible transaction population and baseline measures.
2. Redesign	Remove avoidable transfers and assign responsibilities for routine work, approvals and exceptions.	An agreed process map and a control for each significant risk.
3. Select	Compare tools for cost, compatibility, offline operation, support and export.	A documented choice against the workflow's requirements.
4. Pilot	Migrate a small reconciled sample and test common and high-risk exceptions.	Verified outputs, a defect log and an agreed fallback.
5. Train	Have staff perform routine tasks, correct a mistake and rehearse recovery.	Evidence that staff can operate the process without losing the audit trail.
6. Evaluate	Compare outcomes and review unresolved defects, operating costs and control failures.	A recorded decision to revise, expand or stop the rollout.

For example, a firm can first automate preparing a draft purchase order when recorded stock falls below a level agreed by the manager. A named employee checks exceptional quantities and new suppliers. The pilot reconciles order, delivery and invoice records using a common

reference. If quantities disagree, staff record who resolved the difference and why. This trial tests a specific change and makes it possible to assess time saved, error frequency and the effort required to manage exceptions.

6.4 Operating controls and total cost

The purchase price or subscription covers only part of the investment. Estimate equipment, migration, connectivity, training, support and staff time for operating and reviewing the process. Record one-off and recurring costs separately. Time freed from routine entry may increase capacity without immediately reducing payroll expenditure. The evaluation should distinguish that capacity benefit from a realised cash saving.

Data integrity and continuity belong in the design. Allocate access according to role, verify changes to sensitive master records and review failed or unusual transactions. Test backups and document recovery arrangements. Small business cybersecurity guidance emphasises proportionate governance, protection and recovery (Eliot, 2024). For a business with intermittent connectivity, a temporary register with unique references and a subsequent reconciliation can help prevent missing or duplicate entries.

Test data export, technical support and outage recovery before committing to a vendor. Compare the effort required for routine transactions with the work needed to resolve returns and credit disputes.

6.5 Measuring and interpreting the pilot

Set a primary outcome that corresponds to the original problem. For an invoice bottleneck, measure elapsed time from order confirmation to invoice issue. Define the transaction population, what constitutes completion and how missing timestamps will be handled. Record volumes and use consistent definitions in the baseline and pilot periods. Report the number of transactions supporting each estimate. A median and an upper percentile can show whether a change improves routine processing and the longest delays.

Table 2. Measures of operational performance

Measure	Operational definition	Interpretation or comparison rule
Invoice turnaround	Time from recorded order confirmation to invoice issue.	Use the same start and end events. Report the median and a measure of longer delays.
Correction rate	Eligible transactions requiring one or more corrections divided by transactions processed.	Count each transaction once and distinguish routine returns from data errors.
Stock record accuracy	Counted items with book balances matching physical quantities divided by items checked.	Use the same items or sampling rule and apply a consistent tolerance.
On-time fulfilment	Orders fulfilled by the promised date divided by eligible orders due.	Record outstanding orders, stock-outs and changes in product mix.
Operating cost per transaction	Measured recurring workflow cost divided by eligible completed transactions.	Include staff time and recurring service charges. Report start-up costs separately.

Use comparable working periods and record changes in demand, staffing and procedures. When similar outlets introduce the change at different times, compare performance over shared periods and examine whether baseline trends were comparable. With enough observations around a clearly timed change, an interrupted time series can estimate changes in level or trend while accounting for seasonality and autocorrelation (Bernal et al., 2017).

The decision rule should balance speed, quality and cost. A shorter median invoice time has less value if discrepancies become more frequent or staff must spend more time reconciling accounts. Set the acceptable tolerance for deterioration in quality before testing. Report the uncertainty and practical importance of the observed change. Small pilots can establish whether data capture is feasible and identify operational failures. Estimating a stable effect may require a longer period or more participating workflows.

6.6 Implications for local research

National survey data describe recording practices, while firm surveys and management experiments address adoption and performance at different levels. Future studies could compare Zambian firms with different baseline records, connectivity and staff capacity using shared workflow measures. Reporting failed implementations and unresolved exceptions alongside improvements would help firms judge whether a similar approach is feasible.

7. CONCLUSION

A credible automation pilot starts with a defined workflow, verifiable records and a measurable problem. The proposed framework integrates staff training, workflow redesign and controls for exceptions. It evaluates processing time alongside record accuracy, exceptions and cost so that firms can judge whether a change improved operations under their own conditions.

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