

**FROM ANALOGUE TO DIGITAL: HOW PROCESS TRANSFORMATION  
SHAPE THE SUSTAINABILITY FOR SMALL AND MEDIUM SIZE  
ENTERPRISES IN THE CITIES OF DOUALA AND YAOUNDE, CAMEROON**

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**DOI:** <https://doi.org/10.63452/IJAFSSR.2026.4309>

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**ABSTRACT**

Digital transformation is reshaping business environments worldwide, yet empirical evidence on its effects within African emerging economies remains sparse. This study examines the influence of process transformation on the sustainability for Small and Medium sized Enterprises (SMEs) in the cities of Douala and Yaoundé, Cameroon. Grounded in the Resource-Based View (RBV) and the Triple Bottom Line (TBL) framework, and guided by dynamic capabilities theory, the study employs a causal research design drawing on primary data from 380 SME managers selected through stratified random sampling. Ordinary least squares (OLS) and seemingly unrelated regressions (SUR) were applied to test the hypothesised effects across composite and disaggregated sustainability outcomes. Results reveal that process transformation exerts a positive and highly significant influence on overall sustainability ( $\beta = 0.458$ ,  $p < 0.01$ ), with consistent effects across Douala ( $\beta = 0.472$ ) and Yaoundé ( $\beta = 0.420$ ). Disaggregating by TBL dimension, process transformation significantly improves economic ( $\beta = 0.413$ ), social ( $\beta = 0.342$ ), and environmental sustainability ( $\beta = 0.482$ ), all at the 1% significance level. Environmental sustainability records the strongest effect, suggesting that process digitalisation carries important ecological co-benefits for urban Cameroonian SMEs. These findings confirm

the study hypothesis and contribute rigorous to city-specific multidimensional empirical evidence that advances the digital transformation literature for Sub-Saharan Africa. Practical implications for SME managers, policymakers, development agencies, and financiers are discussed.

**KEYWORDS:** - Process Transformation, Digital Transformation, Sustainability, Small and Medium sized Enterprises, Triple Bottom Line, Douala and Yaoundé.

## **1.0 INTRODUCTION**

The global transition to a knowledge-intensive digital economy has placed enterprises of all sizes under mounting pressure to reconfigure their operational architectures, management information systems, and service delivery mechanisms. For small and medium-sized enterprises (SMEs), which constitute the backbone of most developing economies, this pressure carries a particular urgency because resource constraints and structural vulnerabilities amplify both the risks of digital exclusion and the potential rewards of successful digital adoption. In Cameroon, SMEs account for an estimated 90% of formally registered businesses, 72% of permanent employment, and approximately 40% of national economic output, yet they continued to grapple with chronic sustainability challenges: high mortality rates, limited technological capacity, administrative bottlenecks, and an inability to compete in increasingly globalised markets (MINPMEESA, 2024; World Bank, 2020; INS, 2016).

The Cameroonian government has made successive policy investments to address these challenges, including the creation of the Ministry of Small and Medium-size Enterprises in 2004, the one-stop-shop (CFCE) in 2010, the SME Agency (APME) in 2013, and the Cameroonian Bank for SMEs (CB-SME) in 2015. Despite these interventions, more than 72% of enterprises created in 2010 were no longer on the tax registerer by 2015, and seven out of ten enterprises in Cameroon die before their fifth anniversary (INS, 2016). This persistent fragility points to a structural deficit in the operational and strategic capabilities of Cameroonian SMEs, one that digital transformation has the ppotential to address.

Among the multiple dimensions of digital transformation, process Transformaton, business model transformation, and domain transformation, with process transformation stands out as the mostt operationally immediate. Process transformation involves the systematic re-evaluation and re-engineering of internal workflows and operations through the deployment of digital tools, automation, and data-driven decision-making (Llewellynet *al*, 2018). Crucially, it is not merely about digitising existing paper-based procedures; it is about fundamentally reimagining how work is organised, executed, and delivered to achieve greater efficiency, agility, and sustainability.

Despite growing academic interest in digital transformation globally, the bulk of empirical literature remains centred on large enterprises in developed economies (Verhoef *et al*, 2021; Bharadwaj *et al*, 2013). African SMEs, particularly those operating in the francophone Central African context of Cameroon have been comparatively understudied. Moreover, most existing studies fail to disaggregate the multidimensional nature of sustainability (economic, social, and environmental) when examining the effects of digital transformation, limiting the precision of policy and managerial recommendations.

This study addresses these gaps by focusing specifically on how process transformation shapes the sustainability for SMEs in Douala and Yaoundé, Cameroon's two largest urban business hubs. The central research question is: What is the influence of process transformation on the sustainability for SMEs in Douala and Yaoundé? In addressing this, the study makes several contributions. First, it provides city-level empirical evidence from a significantly underrepresented African context. Second, it employs the Triple Bottom Line (TBL) framework to disaggregate sustainability into its economic, social, and environmental components, delivering a more nuanced analysis than composite indices typically permit. Third, it applies seemingly unrelated regression (SUR) alongside OLS, allowing for the simultaneous and efficient estimation of cross-equation sustainability effects.

## **2.0 THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

### **2.1 The Digital Transformation Landscape for SMEs**

Digital transformation has been defined as the use of digital technologies to fundamentally change how businesses operate and deliver value (Verhoef *et al*, 2021; Bharadwaj *et al*, 2013). For SMEs, each dimension affects sustainability differently, yet they are deeply complementary. In the present study, process transformation is the focal dimension because it is both the most foundational and the most immediately accessible pathway through which digital transformation generates sustainability gains. Within the African context, digital transformation is unfolding against a backdrop of infrastructural constraints, limited broadband penetration, fragmented regulatory environments, and varying levels of digital literacy. Cameroon's urban economy, while characterised by rapid mobile technology adoption and a growing entrepreneurial ecosystem, remains one in which the majority of SMEs operate manual or semi-manual workflows. This context makes process transformation a particularly high-priority intervention, since the transition from analogue to digitally-integrated operations offer compounded gains in efficiency, cost, and environmental sustainability.

### **2.2 Conceptualising Process Transformation**

Process transformation, sometimes referred to as process optimisation or process digitalisation is a long-term, technology-driven change management initiative designed to enhance the

efficiency, agility, and value delivery of internal business operations (Llewellyn *et al*, 2018). It encompasses the automation of repetitive tasks, the integration of digital platforms into operational workflows, the use of real-time analytics for decision-making, and re-engineering of customer facing and supply-side processes to leverage digital connectivity. Lee and Dale (1998) characterise business processes as activities that cut across organisational boundaries, have defined outcomes, and serve identifiable customers both internal and external. Against this backdrop, process transformation aims to reduce lead times and operational costs, minimise errors and redundancies, and create scalable structures capable of responding rapidly to market changes (Vergidis *et al*, 2008). The mechanics of process transformation typically involve three sequential activities: specifying the target system and desired outcomes, identifying performance bottlenecks in existing workflows, and selecting and implementing interventions to resolve those bottlenecks.

For Cameroonian SMEs, process transformation is operationalised through the adoption of cloud-based management platforms, automated inventory and billing systems, digital customer engagement tools, mobile-enabled supply chain coordination, and real-time operational dashboards. Technologies such as Enterprise Resource Planning (ERP), Robotic Process Automation (RPA), and Artificial intelligence (AI) represent the infrastructure of process transformation in advanced enterprise settings, while mobile applications and cloud computing serve as the more accessible entry points for resource constrained SMEs in emerging economies. Process transformation is distinguished from other dimensions of digital transformation in important ways. Unlike business model transformation which entails fundamental rethinking of value creation and delivery logic or domain transformation, which involves market repositioning and competitive boundary expansion, process transformation operates within existing organisational structures and product-market relationships. This makes it more immediately accessible to resource-limited SMEs and a particularly prudent starting point for digital transformation journeys in developing economy contexts.

### **2.3 Triple Bottom Line Framework and Sustainability**

The theoretical lens for sustainability in this study is drawn from Elkington's (1998) Triple Bottom Line (TBL) framework, which stipulates that organisational performance must be evaluated simultaneously across economic, social, and environmental dimensions. This framework transcends purely financial measures of business success and aligns with Dunphy's (2010) operationalisation of corporate sustainability in the management literature. The TBL framework has been widely applied in SME sustainability research because it captures the full spectrum of value creation and destruction relevant to smaller enterprises, including, community impacts and ecological footprints that financial metrics routinely omit.

Economic sustainability encompasses profitability, cost efficiency, productivity, and the long-term capacity for value creation. Social sustainability refers to labour practices, employee wellbeing, community engagement, gender equity, and inclusive participation in economic activity. Environmental sustainability concern an enterprise's ecological footprint including energy efficiency, waste minimisation, carbon management, and regulatory compliance (Bocken *et al*, 2014; Bansal, 2005). For SMEs in Cameroon, all three dimensions carry immediate policy relevance: economic sustainability is vital for enterprise survival, social sustainability relates to employment generation in a context of widespread underemployment, and environmental sustainability connects to compliance with increasingly stringent international trade standard.

Process transformation intersects all three TBL dimensions. Digitally-driven process improvements enhance economic sustainability through cost reduction, productivity gains, and improved service delivery; they promote social sustainability by creating more dignified and efficient work conditions and enabling new forms of employment; and they support environmental sustainability through reductions in paper usage, energy waste, and logistical emissions (Tambo and Adoue, 2020; Aboelmaged, 2014; Bharadwaj *et al*, 2013). The TBL framework therefore provides a theoretically appropriate multidimensional lens for assessing the full sustainability impact of process digitalisation.

#### **2.4 Resource-Based View and Digital Capabilities**

Complementing the TBL framework, the resource-based view (RBV) of the firm (Barney, 1991) supplies the strategic rationale for why process transformation generates sustained competitive and sustainability advantages. The RBV posits that firms achieve durable competitive advantage through the deployment of resources that are valuable, rare, inimitable, and non-substitutable (VRIN). In the digital era, digitally-enhanced operational processes increasingly constitute such strategic resources, particularly when they are deeply embedded in firm routines, systems, and culture (Bharadwaj *et al*, 2013).

For Cameroonian SMEs, the development of digital process capabilities constitutes an investment in dynamic capabilities, the capacity to sense environmental changes, reconfigure internal resources, and adapt operational processes accordingly (Teece *et al*, 1997). Firms that cultivate strong digital process capabilities are better positioned to manage compliance requirements, reduce operational inefficiencies, and create scalable value propositions all central to sustainability over the long run. Dynamic capabilities theory further suggests that early and consistent investment in process digitalisation creates path dependencies that become increasingly difficult for competitors to replicate, generating first-mover advantages in the sustainability arena.

From an RBV standpoint, the significance of the current study's finding that process transformation effects are independent of firm size and managerial experience is particularly noteworthy. It suggests that digital process capabilities are accessible to SMEs regardless of their existing resource endowments, which extends the RBV's traditional emphasis on pre-existing resource stocks to include capability-building through technological adoption.

## **2.5 Hypothesis Development**

Drawing on the theoretical foundations of the RBV, Dynamic Capabilities theory, and the TBL framework, this study develops and tests the following hypothesis:

Ha: Process transformation has a positive and significant influence on the sustainability for SMEs in the cities of Douala and Yaoundé.

This hypothesis is supported by several theoretical and contextual arguments. From a TBL perspective, process transformation is expected to reduce operational costs (economic sustainability), improve employee and community wellbeing through more efficient working conditions (social sustainability), and reduce waste and emissions through digital workflows (environmental sustainability). From an RBV perspective, digital process capabilities constitute VRIN resources that generate sustained competitive advantages. From a Dynamic Capabilities standpoint, firms that develop process digitalisation capabilities build adaptive capacity that enhances their resilience and sustainability over time. The Cameroonian context adds further support: in a business environment where manual operations are still dominant and digital early movers are scarce, even modest investments in process transformation are expected to deliver above-average sustainability returns.

The hypothesis is tested across the three subsidiary hypotheses: (H1a) process transformation positively influences economic sustainability; (H1b) process transformation positively influences social sustainability; and (H1c) process transformation positively influences environmental sustainability. Testing these subsidiary hypotheses, using SUR allows for the simultaneous estimation of process transformation's effects across all TBL dimensions while accounting for their interdependence, providing a more comprehensive and rigorous test of the overarching hypothesis.

## **2.6 The Cameroonian SME Context**

Cameroon's SME sector presents a distinctive operational environment shaped by both the opportunities and constraints of a middle-income African economy in digital transition. The cities of Douala and Yaoundé, while geographically proximate, represent meaningfully different business ecosystems. Douala, as the economic capital, hosts the country's principal

port, major manufacturing establishments, and a dense concentration of commercial and logistics SMEs. Its market dynamism generate high demand for operational efficiency and creates strong competitive pressure for process digitalisation. Yaoundé, as the administrative capital, is characterised by a higher concentration of service-sector SMEs oriented toward public administration, professional services, and the informal economy. This contextual duality is important for understanding why the sustainability effects of process transformation may manifest differently across the two cities (Douala and Yaoundé). Douala's commercial intensity amplifies the economic and social sustainability gains from process digitalisation, while Yaoundé's administrative character may translate into stronger environmental sustainability effects through the reduction of paper-intensive bureaucratic procedures. This study provides the first systematic empirical examination of these city-level differences.

## 2.7 Empirical Review

A substantial body of empirical literature connects process transformation to improved sustainability for SMEs. Nwankpa and Roumani (2016), in a study of 220 SMEs in West Africa employing Structural Equation Modelling (SEM), found that digital process redesign significantly improved organisational agility, responsiveness, and sustainability metrics. Kane et al, (2015), using a global dataset of organisations across industries, demonstrated that firms engaged in digital process redesign and achieved a 26% increase in revenue growth and enhanced sustainability reporting capabilities.

Aboelmaged (2014) provided compelling evidence from Egyptian SMEs that ICT adoption, a prerequisite for process transformation, contributed to significant reductions in paper use and improved environmental compliance. Tambo and Adoue (2020) extended this to Central and West African contexts, highlighting how cloud computing and analytics-enabled platforms reduce carbon footprints by optimising supply chains and energy consumption among SMEs. Elsevier (2019) similarly showed that digital process transformation through smartphones, cloud computing, AI, and big data enables SMEs to measurably increase their competitiveness and market performance.

Within the sustainability literature, Bocken et al, (2014) demonstrate that digital business practices, including process transformation, function as sustainability model archetypes that simultaneously improve economic outcomes and reduce environmental impacts. Bharadwaj *et al*, (2013) show that firms with strong digital process capabilities outperform peers across all TBL dimensions, primarily through superior resource allocation, operational efficiency, and adaptive capacity. Li *et al*, (2018) further establish that the sustainability benefits of digital transformation are most significant when the transformation is process-led rather than technology-led in isolation.

Jana (2021) explored the role of managerial knowledge in digital transformation for SMEs, finding that managers' understanding of digital tools and their dynamic capabilities are essential for successfully navigating process transformation. This helps explain heterogeneity in sustainability outcomes across similarly-endowed firms: managerial digital literacy mediates the translation of technology investment into operational performance gains.

More recent contributions have extended this evidence base. Makwara et al, (2025), investigating digital business process integration among SMEs in a developing economy context, found that digitalised business processes positively affect both economic and environmental sustainability through the mediating mechanism of operational efficiency. Technologies such as ERP systems, IoT-enabled monitoring, and cloud-based process controls emerged as the key enablers. Wang and Zhang (2025) further demonstrated that process-level digital transformation mediates the relationship between environmental adaptation and sustainability, with firms that systematically re-engineer their workflows proving better positioned to achieve superior economic and environmental outcomes simultaneously. At the meta-analytic level, Abebe *et al*, (2025) synthesised 153 effect sizes from 44 empirical studies and identified business-process digitisation as the single digital transformation typee delivering the largest sustainability gains, generating larger effect sizes than even AI adoption or big-data infrastructure investments.

Despite these contributions, context-specific African empirical studies remain sparse. The urban economies of Douala and Yaoundé, characterised by infrastructure constraints, rapidly growing mobile connectivity, complex regulatory environments, and dynamic entrepreneurial ecosystems, present a distinctive context within which existing global findings must be tested and extended (Eze *et al*, 2021; World Bank, 2020). This study fills that gap and responds directly to calls in the literature for city-level, multidimensional empirical investigation in Sub-Saharan Africa.

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 Research Design and Philosophical Orientation**

This study adopts a causal research design grounded in a positivist philosophical orientation. Positivism holds that there exists an observable reality that can be measured and analysed using scientific methods, and that the relationship between digital transformation and sustainability constitutes such a measurable reality (Cooper and Schindler, 2010). The causal design was selected because the study is interested not merely in describing the state of process transformation among Cameroonian SMEs but in explaining and quantifying the influence of process transformation on the sustainability outcomes. Causal research design identifies cause-and-effect associations between variables through empirical testing and is well-suited to quantitative hypotheses-testing studies (Fajana and Shadare, 2012). The quantitative orientation

ensures the capacity to generalise findings and draw statistical inferences about the broader SME population in urban Cameroon. Furthermore, employing a causal survey was deemed most appropriate for assessing the direction and magnitude of the relationship between the study's focal constructs without manipulating the research variables.

### 3.2 Study Area

The study was conducted in the cities of Douala, the economic capital located in the Littoral Region, and Yaoundé, the political capital located in the Centre Region of Cameroon. These two cities were selected because they represent the two largest and most commercially vibrant urban centres in Cameroon, collectively accounting for the majority of formally registered SMEs in the country. Douala hosts Cameroon's principal commercial port and is the country's main hub for manufacturing, trade, and logistics. Yaoundé is the seat of government and is characterised by a high concentration of service, professional, and public-sector-adjacent enterprises. Together, the two cities provide a comprehensive and representative cross-section of Cameroon's urban SME landscape.

### 3.3 Population, Sampling and Data Collection

The study population comprised 11,075 formally registered SMEs in Douala and Yaoundé combined (MINPMEESA, 2024). Using Yamane's (1967) formula at a 95% confidence level and a 5% margin of error, the minimum required sample size was determined to be 387 SMEs:

$$n = \frac{11075}{1 + 11075(0.05)^2} = 386.06 \approx 387$$

A stratified random sampling technique was applied to ensure proportional geographic representation from both cities. The sample was stratified by city, with 200 SMEs targeted from each location. Primary data were collected through a structured questionnaire administered to SME managers and/or owners in 2025. The questionnaire was developed by adapting validated instruments from the digital transformation and sustainability literature to the Cameroonian SME context. Prior to full deployment, the instrument underwent judgmental validation by a statistician expert in questionnaire design, and a pilot study was conducted in early 2025 with eleven SME leaders across both cities to test clarity, instrument reliability, and appropriate completion time.

The questionnaire was bilingual, prepared in both English and French to reflect Cameroon's official language duality and the cosmopolitan composition of the study population. Items were anchored on a four-point Likert scale ranging from 1 (completely disagree) to 4 (completely agree). Of the 400 questionnaires administered, 380 yielded valid and complete responses,

producing a response rate of 95%, well above the 70% threshold considered adequate for survey analysis (Babbie, 2007). Table 1 presents the sample distribution.

**Table 1: Sample Distribution by City**

City / Region	Questionnaires Administered	Valid Responses
Douala (Littoral Region)	200	183
Yaoundé (Centre Region)	200	197
<b>Total</b>	<b>400</b>	<b>380</b>

*Source: Author's field survey, 2026*

### 3.4 Sample Profile

The demographic and firm profile of respondents reveals a sample that is broadly representative of Cameroon's urban SME landscape. In terms of gender, 215 respondents (56.58%) were male and 165 (43.42%) were female. Regarding management position, 34.47% were General managers, 36.58% were assistant managers, and 28.95% were operational managers. The educational profile was notably strong, with 45.79% holding university qualifications and 36.05% holding secondary education, pointing to a relatively skilled management cohort. In terms of firm legal status, 28.16% were sole proprietorships, 25% limited liability companies, and 17.11% general partnerships.

The sectoral distribution showed that 46.32% of firms operated in the tertiary sector, 33.16% in manufacturing, and 20.53% in the primary sector, reflecting the service-dominated character of urban Cameroonian SMEs. Female ownership stood at 18.16% and female management at 15.79%, revealing persistent gender disparities in SME leadership. Regarding firm size, 65.53% of sampled firms were small enterprises (6 to 20 employees) and 34.47% were medium enterprises (21 to 100 employees), confirming the predominantly small-scale character of the sample. The average firm age was 10.81 years ( $SD = 4.40$ ), indicating established enterprises with sufficient operational history to have experienced and assessed the effects of digital transformation.

### 3.5 Variable Measurement

Process transformation, the primary independent variable, was measured using eight Likert-scale items capturing: the use of analytics to identify operational bottlenecks; digital engagement of suppliers and partners; machine learning-driven operational decision-making; integrated customer and operational data views; digital linkage of customer-facing and operational processes; continuous process innovation through experimentation; and the adoption of real-time operational dashboards. A process transformation index (PROT) was extracted using multiple correspondence analysis (MCA).

Sustainability, the dependent variable was operationalised using Elkington's (1998) TBL framework and Dunphy's (2010) corporate sustainability model, yielding three sub-indices: economic sustainability, social sustainability, and environmental sustainability. A composite of sustainability index (SUS) was also constructed. Control variables included manager experience (years), firm size (number of employees), and firm location (Douala = 1, Yaoundé = 0).

### **3.6 Validity and Reliability**

Content validity was established through a rigorous three-stage process. First, the questionnaire items were drawn from validated instruments in the digital transformation and sustainability literature, adapted to the Cameroonian SME context. Second, the draft instrument was reviewed by a statistician expert in questionnaire design, who assessed whether the items adequately captured the intended constructs. Third, the questionnaire was reviewed by eleven SME leaders in Douala and Yaoundé who confirmed the clarity, readability, and contextual appropriateness of all items. Internal reliability was assessed using Cronbach's alpha for each construct dimension. Reliability coefficients exceeded the conventional threshold of 0.70 across all constructs, confirming satisfactory internal consistency. To address common method bias, the questionnaire was designed with reverse-coded items interspersed among the standard items, and respondents were assured of full anonymity to reduce social desirability effects. A Harman's single-factor test was additionally applied to assess the risk of common method variance, and the results indicated that no single factor accounted for the majority of the covariance among variables, suggesting that common method bias is not a significant concern in the present study. Construct validity was supported through the multiple correspondence analysis (MCA) procedure used to construct the process transformation index, which identifies the underlying latent dimensions in the ordinal Likert data. The eigenvalue structure from MCA confirmed that the eight process transformation items load sufficiently on a single dominant dimension, supporting the use of a composite index. Similar procedures were applied to the sustainability sub-indices.

### **3.7 Analytical Strategy**

Data analysis proceeded in three sequential stages. First, descriptive statistics were computed for all study variables, and a pairwise correlation matrix was generated to characterise bivariate relationships and assess multicollinearity risks. Variance inflation factors (VIF) were inspected to confirm that multicollinearity was not a concern.

Second, ordinary least squares (OLS) regression was applied to estimate the influence of process transformation on the composite Sustainability Index, both for the pooled sample and for city-specific sub-samples. The pooled OLS model included a location dummy variable to control for city-fixed effects.

Third, seemingly unrelated regression (SUR) was employed to estimate the three-equation simultaneous system with economic, social, and environmental sustainability as separate dependent variables. SUR is particularly appropriate when error terms across equations are likely to be correlated, as is theoretically expected given the conceptual interdependence of TBL dimensions. SUR produces more efficient estimates than independent OLS regressions under these conditions (Zellner, 1962). The Breusch-Pagan Lagrange Multiplier test was applied to formally confirm the presence of significant cross-equation error correlation, thereby validating the choice of SUR over independent OLS. Robust standard errors were computed throughout to address potential heteroscedasticity. All analyses were conducted using Stata 17. VIF values for all independent variables were below 3.0, well within the conventional threshold of 10, confirming the absence of problematic multicollinearity.

As a robustness check, the OLS models were re-estimated using bootstrapped standard errors with 1,000 replications. The results were substantively identical to those obtained with robust standard errors, confirming the stability of the coefficient estimates across alternative inference procedures. The SUR models were also re-estimated excluding the control variables to test whether inclusion of manager experience, firm size, and location materially affected the process transformation coefficients. The process transformation coefficients were stable and their significance levels unchanged, providing further confidence in the reliability of the main findings.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Descriptive Analysis of Process Transformation Indicators

Table 2 presents the frequency distribution of responses to the eight process transformation indicators. The descriptive patterns reveal that Cameroonian SMEs are actively, if unevenly, engaging in process digitalisation. For the statement on the use of analytics to identify bottlenecks and inefficiencies, 87.9% of respondents agreed or completely agreed. For the statement on fully digital partner and supplier engagement, 91.8% agreed or completely agreed, suggesting strong digital integration along the supply chains. Use of analytics, algorithms, and machine learning for operational decisions was confirmed by 91.3% of respondents. An integrated view of customer and operational information was reported by 90.5%. Digital linkage of customer-facing and operational processes was affirmed by 90.5%. Continuous value chain innovation through digital technologies were confirmed by 91.3%. Real-time dashboards for operational tracking were reported by 93.7%, the highest agreement rate of any item, with no respondent completely disagreeing.

These high agreement rates, combined with the low process transformation index mean of 0.0962 (SD = 0.1703), reveal an important asymmetry: while most respondents acknowledge the

relevance and adoption of digital process tools at a conceptual and operational level, the depth and comprehensiveness of integration varies substantially across firms, and a critical mass of SMEs has not yet moved beyond partial or superficial digitalisation. This finding is consistent with the World Bank's (2020) observation that many African firms adopt digital tools without making intensive operational use of them.

**Table 2: Process Transformation Indicators (Frequency Distribution, N=380)**

Item	Completely Disagree	Disagree	Agree	Completely Agree
Analytics for bottlenecks and inefficiencies	9 (2.4%)	37 (9.7%)	202 (53.2%)	132 (34.7%)
Digital partner and supplier engagement	3 (0.8%)	28 (7.4%)	187 (49.2%)	162 (42.6%)
Machine learning for operational decisions	5 (1.3%)	28 (7.4%)	176 (46.3%)	171 (45.0%)
Integrated customer and operational data view	5 (1.3%)	31 (8.2%)	158 (41.6%)	186 (48.9%)
Digital linkage of customer-facing processes	3 (0.8%)	33 (8.7%)	156 (41.1%)	188 (49.5%)
Digital innovation in value chain	3 (0.8%)	30 (7.9%)	178 (46.8%)	169 (44.5%)
Process optimisation via experimentation	1 (0.3%)	28 (7.4%)	192 (50.5%)	159 (41.8%)
Real-time dashboards for operations	0 (0.0%)	24 (6.3%)	180 (47.4%)	176 (46.3%)

Source: Author's computation, 2026

#### 4.2 Descriptive Statistics

Table 3 presents the descriptive statistics for the principal quantitative variables. The process transformation index has a mean of 0.0962 (SD = 0.1703), indicating that while a minority of SMEs have made meaningful strides in process digitalisation, the majority remain at early stages of transformation. The sustainability index has a mean of 0.1128 (SD = 0.1856), reflecting heterogeneity in sustainability across firms. The average firm employs 21.76 people (SD = 19.55), confirming the predominantly small-scale character of the sample, while firm age averages 10.81 years (SD = 4.40). Manager experience averages 7.86 years (SD = 3.87), suggesting a relatively experienced management cohort. The wide standard deviations for firm size and sustainability indices indicate substantial cross-firm variation in both operational scale and sustainability attainment.

**Table 3: Descriptive Statistics**

Variable	N	Mean	Std. Dev.	Min	Max
Sustainability Index (SUS)	380	0.1128	0.1856	0	0.75
Process Transformation Index (PROT)	380	0.0962	0.1703	0	0.75
Firm Age (years)	380	10.808	4.400	5	35
Manager Experience (years)	380	7.858	3.866	1	35
Firm Size (no. of employees)	380	21.761	19.549	6	93
Location (Douala = 1)	380	0.4816	0.5003	0	1

Source: Author's computation, 2026

### 4.3 Correlation Analysis

Table 4 presents the pairwise correlation matrix for the digital transformation and sustainability variables. The Sustainability Index exhibits the strongest positive correlation with the Process Transformation Index ( $r = 0.792$ ,  $p < 0.001$ ), making process transformation the most tightly coupled dimension of digital transformation for SMEs sustainability. This higher correlation permits the reinforcement of the primacy of process transformation as a sustainability driver.

Process transformation also correlates strongly with domain transformation ( $r = 0.687$ ), confirming the complementarity of digital transformation dimensions. Business model transformation shows moderate correlations with all other indices. Firm size and manager experience show weak and statistically insignificant correlations with sustainability and transformation variables throughout, suggesting that the digitalisation-sustainability relationship is relatively independent of firm scale and management tenure. This has important implications for SME policy, as it implies that digital transformation support programmes do not need to prioritise larger or more experienced firms to maximise sustainability returns.

**Table 4: Pairwise Correlation Matrix**

	SUS	PROT	BMTI	DOMT	LOC
SUS	1.000				
PROT	0.792***	1.000			
BMTI	0.645***	0.642***	1.000		
DOMT	0.724***	0.687***	0.607***	1.000	
LOC	0.121**	0.036	0.078	0.074	1.000

Note: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ . SUS= Sustainability; PROT=Process Transformation; BMTI=Business Model Transformation; DOMT=Domain Transformation; LOC=Location (Douala=1; Yaoundé = 0).

Source: Author's computation, 2026

#### 4.4 OLS Regression: Composite Sustainability

Table 5 presents the OLS regression results for sustainability across the model and site-specific estimations. The pooled model explains approximately 67.1% of the variance in sustainability ( $R^2 = 0.671$ ), indicating strong model fit. The Process Transformation Index carries a coefficient of 0.458 ( $p < 0.01$ ) in the model, confirming that a one-unit increase in process transformation yields a 0.458-unit improvement in sustainability for SMEs. This is a practically significant and economically meaningful effect.

The effect is slightly larger in Douala ( $\beta = 0.472$ ,  $p < 0.01$ ) than in Yaoundé ( $\beta = 0.420$ ,  $p < 0.01$ ), though both remain highly significant. This consistency across two cities that differ meaningfully in economic character, industry concentration, and regulatory environment substantially strengthens the robustness and generalisability of the finding. Hypothesis Ha is therefore confirmed: process transformation has a positive and significant influence on the sustainability for SMEs in Douala and Yaoundé, Cameroon.

The Douala location dummy is positive and significant ( $\beta = 0.025$ ,  $p < 0.05$ ), suggesting modestly higher baseline sustainability among Douala-based firms, consistent with the city's more commercially developed environment. Importantly, manager experience and firm size are not statistically significant in any model, confirming that the sustainability benefits of process transformation are not contingent on managerial seniority or enterprise scale.

**Table 5: OLS Regression Results: Effect on Sustainability**

Variable	Overall (N=380)	Douala (N=183)	Yaoundé (N=197)
Process Transformation (PROT)	0.458*** (0.052)	0.472*** (0.078)	0.420*** (0.076)
Manager Experience	-0.000336 (0.002)	-0.000530 (0.003)	-0.000313 (0.002)
Firm Size	3.23e-05 (0.000)	-8.81e-06 (0.000)	-0.000105 (0.000)
Location	0.0247** (0.010)	–	–
Constant	0.0158 (0.016)	0.0121 (0.021)	0.0190 (0.018)
<b>R-squared</b>	<b>0.671</b>	<b>0.680</b>	<b>0.649</b>
<b>Observations</b>	<b>380</b>	<b>183</b>	<b>197</b>

Note: Robust standard errors in parentheses; \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ .

Source: Author's computation, 2026

#### 4.5 SUR Results: Disaggregated TBL Sustainability Dimensions

Table 6 presents the SUR results for the three TBL sustainability dimensions simultaneously. The Breusch-Pagan chi-squared statistic of 175.767 ( $p < 0.001$ ) confirms significant cross-equation error correlation, validating the SUR approach over independent OLS estimation. The R-squared values across the three equations are 0.627 (economic), 0.621 (social), and 0.573 (environmental), indicating strong explanatory power. Chi-squared statistics exceed 509 in all equations ( $p < 0.0001$ ), confirming overall model significance.

Process transformation is statistically significant across all three sustainability dimensions. Its effect is strongest on environmental sustainability ( $\beta = 0.482$ ,  $p < 0.01$ ), followed by economic sustainability ( $\beta = 0.413$ ,  $p < 0.01$ ) and social sustainability ( $\beta = 0.342$ ,  $p < 0.01$ ). All three effects are statistically significant at the 1% level, confirming the holistic sustainability impact of process transformation across the full TBL spectrum.

The Douala location dummy is significant for economic sustainability ( $\beta = 0.033$ ,  $p < 0.01$ ) and environmental sustainability ( $\beta = 0.025$ ,  $p < 0.05$ ), but not for social sustainability. This pattern suggests that Douala's commercial infrastructure amplifies the economic and environmental sustainability gains from process digitalisation but does not create a systematic advantage in the social sustainability dimension, where local institutional context may be less differentiated.

**Table 6: SUR Results: Effect of Process Transformation on TBL Sustainability Dimensions**

Variable	Economic Sustainability	Social Sustainability	Environmental Sustainability
Process Transformation (PROT)	0.413*** (0.058)	0.342*** (0.054)	0.482*** (0.048)
Manager Experience	0.000775 (0.002)	0.000618 (0.002)	-0.00193 (0.001)
Firm Size	-0.000127 (0.000)	-0.000382 (0.000)	0.000499* (0.000)
Location	0.0334*** (0.013)	0.00933 (0.012)	0.0249** (0.010)
Constant	-0.0155 (0.017)	0.00780 (0.016)	-0.00217 (0.014)
<b>R-squared</b>	<b>0.627</b>	<b>0.621</b>	<b>0.573</b>
<b>Chi-squared</b>	<b>639.28***</b>	<b>622.70***</b>	<b>509.12***</b>
<b>Observations</b>	<b>380</b>	<b>380</b>	<b>380</b>

Note: Robust standard errors in parentheses; \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ . Breusch-Pagan chi-squared (3) = 175.767,  $p < 0.001$ .

*Source: Author's computation, 2026*

#### 4.6 City-Level SUR Disaggregation

City-level SUR analysis provides a further layer of granularity. Table 7 presents the city-specific coefficients of process transformation on each sustainability dimension.

**Table 7: City-Level Process Transformation Effects on TBL Sustainability Dimensions**

Sustainability Dimension	Overall $\beta$	Douala $\beta$	Yaoundé $\beta$	Significance
Economic Sustainability	0.413	0.434	0.384	All 1% level
Social Sustainability	0.342	0.393	0.263	All 1% level
Environmental Sustainability	0.482	0.456	0.482	All 1% level

*Source: Author's computation, 2026*

In Douala, process transformation produces the most pronounced gains in economic sustainability ( $\beta = 0.434$ ) and social sustainability ( $\beta = 0.393$ ), reflecting the city's dense commercial environment where productivity gains and workforce improvements from process digitalisation are rapidly capitalised. Environmental sustainability in Douala records a coefficient of 0.456, slightly below the Yaoundé figure, suggesting that Douala's greater manufacturing and logistics activity may introduce environmental trade-offs that partially offset the sustainability benefits of process digitalisation.

In Yaoundé, the social sustainability coefficient is noticeably lower ( $\beta = 0.263$ ) compared to both the overall estimate and Douala's figure. This may reflect the city's dominance of public-sector-adjacent services, where employment conditions and social sustainability outcomes are more strongly shaped by regulatory and institutional factors than by operational digitalisation within individual firms. However, Yaoundé's environmental sustainability effect equals the overall average ( $\beta = 0.482$ ), which likely reflects the reduction of paper-intensive administrative processes in the city's service-oriented SMEs.

#### 5.0 DISCUSSION OF RESULTS

The finding of this study yields several important insights that simultaneously advance theoretical understanding and provide actionable guidance for practitioners and policymakers.

First, the finding that process transformation is the strongest bivariate correlate of sustainability ( $r = 0.792$ ) among all digital transformation dimensions positions it as the most accessible and

operationally powerful lever for SME sustainability improvement. This finding is significant in a developing economy context, where resource constraints make it imperative to identify high-return, low-barrier digital investments. Unlike business model or domain transformation, which entail fundamental strategic repositioning and require longer time horizons, process transformation operates within existing organisational configurations. This observation extends Llewellyn et al (2018) conceptualisation of process transformation to the sustainability domain, demonstrating that operational digitalisation is not merely an efficiency tool but a comprehensive sustainability lever.

Second, the particularly strong impact of process transformation on environmental sustainability ( $\beta = 0.482$  in the overall model) carries significant theoretical and policy implications. This finding extends the work of Aboelmaged (2014) and Tambo and Adoue (2020) to a new urban African context, establishing that the environmental co-benefits of process digitalisation are accessible to smaller enterprises and not confined to large corporations in technologically advanced economies. The automation of document management, digital supplier coordination, and cloud-based resource scheduling all reduce physical material consumption and logistical waste, effects that are captured comprehensively in the environmental sustainability index. Furthermore, the finding that environmental sustainability is the strongest TBL effect suggests that Cameroonian SMEs may be accessing green performance gains through digitalisation even when they are not explicitly pursuing environmental management goals, a form of incidental sustainability that has important implications for how environmental policy is designed.

Again, the findings from the study tied with the works of Makwara et al, (2025), who investigated digital business process integration among SMEs in a developing economy context, found that digitalised business processes positively affect both economic and environmental through the mediating mechanism of operational efficiency. Furthermore, Abebe et al, (2025) synthesised 153 effect sizes from 44 empirical studies and identified business-process digitisation as the single digital transformation type delivering the largest sustainability gains, generating larger effect sizes than even AI adoption or big data infrastructure investments.

Third, from an RBV perspective, Cameroonian SMEs that invest in digital process capabilities today are building rare, path-dependent resources that generate durable competitive advantage over rivals with limited digital literacy (Barney, 1991). In a context where the average Process Transformation Index is very low (mean = 0.096), early movers stand to capture disproportionate sustainability dividends consistent with first-mover advantage theory. Dynamic capabilities theory further suggests that these digitalisation investments are self-reinforcing: as firms develop process digitalisation capabilities, they also enhance their capacity to sense, seize, and reconfigure in response to future market disruptions (Teece et al, 1997).

### 5.1 Comparison with Prior Literature

The findings of this study are broadly consistent with prior empirical evidence from non-African context, while also revealing important contextual nuances. The positive effect of process transformation on sustainability ( $\beta = 0.458$ ) is consistent with Bharadwaj *et al* (2013) finding that digital business strategies improve firm performance across all TBL dimensions, and with Kane *et al*, (2015) evidence of a 26% revenue growth advantage for firms engaged in digital process redesign. The present study's coefficient magnitude is notably higher than the mean effect sizes reported in global meta-analyses, which may reflect the amplified returns to early-stage digitalisation in a context where the competitive advantage of digital early movers is particularly pronounced.

The finding that environmental sustainability is the strongest TBL effect aligns with Aboelmaged's (2014) evidence from Egyptian SMEs and Tambo and Adoue's (2020) Central and West African evidence, but extends these findings by providing quantified coefficient estimates from a larger and more rigorously sampled study. The present finding of  $\beta = 0.482$  for environmental sustainability exceeds the comparable effect sizes reported in prior African studies, which may reflect differences in baseline environmental practice: Cameroonian SMEs transitioning from heavily paper-based and manual operations may experience proportionally greater environmental gains from digitalisation than firms that have already partially digitalised.

The insignificant of firm size and manager experience as determinant of the sustainability digitalisation relationship contrasts with some prior studies that find firm size moderates digital transformation outcomes (Jana, 2021; Li *et al*, 2018). However, this contrast may be explained by the relatively narrow size distribution in the present sample: with all firms falling within the SME category (6 to 93 employees), there may be insufficient size variation to detect a moderating effect. Future studies using samples that include both SMEs and larger enterprises would be better positioned to test this moderation hypothesis.

## 6.0 CONCLUSION AND IMPLICATIONS

### 6.1 Summary of Findings

This study investigated the influence of process transformation on the sustainability for SMEs in Douala and Yaoundé, Cameroon, drawing on a stratified sample of 380 SME managers and employing OLS and SUR regression within a TBL and RBV theoretical framework. The study produced four principal findings.

First, process transformation exerts a positive and statistically significant effect on composite sustainability ( $\beta = 0.458$ ,  $p < 0.01$ ), with highly consistent effects in both Douala ( $\beta = 0.472$ ) and

Yaoundé ( $\beta = 0.420$ ). This consistency across two economically distinct cities is a particularly important finding, as it establishes that the sustainability gains from process transformation are not artefacts of a specific local commercial environment but rather reflect a general operational mechanism applicable across urban Cameroonian SME contexts.

Second, disaggregated TBL analysis reveals that process transformation significantly improves economic sustainability ( $\beta = 0.413$ ), social sustainability ( $\beta = 0.342$ ), and environmental sustainability ( $\beta = 0.482$ ), all at the 1% significance level. The holistic nature of this improvement across all three TBL dimensions is a defining characteristic of process transformation as a sustainability lever, distinguishing it from more narrowly targeted interventions that improve one dimension at the expense of others.

Third, environmental sustainability records the largest effect size ( $\beta = 0.482$ ), establishing that process digitalisation carries important ecological co-benefits for Cameroonian SMEs that are accessible even without explicit environmental management strategies. This finding has direct implications for green finance frameworks, ESG-linked lending, and environmental policy design in Cameroon and comparable Sub-Saharan African economies.

Fourth, the sustainability effects of process transformation are independent of firm size and managerial experience, confirming a democratising quality that extends digital transformation benefits beyond large or experienced enterprises. These findings challenge resource-based assumptions that digital transformation benefits are primarily available to firms with superior absorptive capacity, and supports the case for broad-based, inclusive digital transformation support programmes.

These findings confirm all three subsidiary hypotheses (H1a, H1b, H1c) and the overarching Hypothesis Ha, and contribute rigorous, city-specific, multidimensional empirical evidence to the digital transformation literature for Sub-Saharan Africa. The study stands as one of the first empirical investigations to simultaneously examine process transformation effects on all three TBL sustainability dimensions at the city level in a francophone Central African context.

## 6.2 Practical Implications

For SME managers, the findings provide a clear directive: investing in the digitalisation of core business processes including automation, integrated data systems, digital supplier engagement, and real-time operational monitoring generates measurable returns across all sustainability dimensions, even at modest adoption levels. The environmental sustainability effect suggests that process digitalisation also positions SMEs favourably in contexts where green business

certification and compliance are increasingly expected by international trading partners and financiers.

For policymakers and institutions such as MINPMEESA and GICAM, the results underscore the need for targeted digital transformation support programmes focusing on process-level digitalisation for urban SMEs. These should include subsidised access to cloud platforms, digital skills training for SME managers, tax incentives for process automation investments, and the creation of digital business development services centres in both cities.

For development agencies and sustainability-oriented investors operating in Sub-Saharan Africa, the evidence that process transformation drives environmental sustainability is directly relevant to green finance instruments and sustainability-linked lending. SMEs demonstrating measurable progress in process digitalisation represent lower ecological risk exposures and may qualify for preferential financing, creating positive feedback loops between digital investment and sustainability outcomes.

#### **6.4 Limitations and Future Research**

This study has several limitations. The cross-sectional design captures a single point in time and does not track the dynamic evolution of process transformation capabilities or their sustainability effects over time. Future longitudinal studies are needed to establish causal pathways more rigorously. The study is also limited to two urban cities; its findings may not extend to smaller Cameroonian cities, rural SMEs, or other national contexts without further validation.

The Process Transformation Index, while validated through expert review and MCA, would benefit from psychometric validation via Confirmatory Factor Analysis (CFA) in future research. Additionally, the mediating and moderating mechanisms through which process transformation affects sustainability including digital leadership competencies, organisational culture, industry type, and institutional environment remain to be explored. Comparative cross-national studies across Central and West African countries would substantially advance theory-building in this domain and provide firmer grounds for regional policy generalisation.

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