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The Effect Of Access To And Use Of Information Communication Technology On Growth Of Small And Medium Enterprises In Hargeisa, Somaliland.

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ABSTRACT: *This study empirically investigated the effect of access to and use of Information and Communication Technology (ICT) on the growth of Small and Medium Enterprises (SMEs) in Hargeisa, Somaliland. The research was grounded in the Technology-Organization-Environment (TOE) framework, which posits that technological adoption is influenced by the interplay of technological, organizational, and environmental contexts. A mixed-methods approach was adopted, combining a cross-sectional survey of 291 SME owners and managers, selected through stratified and simple random sampling from a population of 2,183, with semi-structured interviews with seven key institutional stakeholders. Quantitative data were analyzed using descriptive statistics, Pearson correlation, and linear regression. The findings revealed a very strong, positive, and statistically significant relationship between ICT access and use and SME growth ($r = 0.973$, $p < 0.001$). The regression analysis confirmed that ICT was a paramount predictor, explaining 94.7% of the variance in SME growth. Consequently, the null hypothesis (H_0) stating no significant effect was rejected. The study concluded that access to and use of ICT has a profound positive effect on SME growth in Hargeisa. Key drivers included strong internal peer support and a supportive external community, highlighting the significant roles of the organizational and environmental contexts within the TOE framework. The study recommends that SME owners strategically invest in ICT and foster a supportive digital culture, while policymakers should prioritize enhancing digital infrastructure, affordability, and literacy to harness the full potential of the digital economy for sustainable local development.*

Keywords: Information and Communication Technology (ICT), SME Growth, Technology-Organization-Environment (TOE) Framework, Hargeisa, Somaliland, Digital Adoption, Regression Analysis, Business Performance.

1. INTRODUCTION

In the contemporary global economy, Small and Medium Enterprises (SMEs) are universally acknowledged as critical engines of economic growth, job creation, and poverty alleviation. This is particularly true in developing regions, where they constitute the vast majority of the business landscape and serve as a primary source of livelihood for burgeoning populations. The resilience and innovative capacity of SMEs are often cited as key drivers for sustainable development, especially in post-conflict and nascent states striving for economic stability and integration into the wider world market. The potential of these enterprises to catalyze broad-based economic progress makes their performance and growth trajectories a subject of paramount importance for policymakers and development practitioners alike (World Bank, 2023). However, the realization of this potential is frequently constrained by a myriad of challenges, including limited access to finance, inadequate infrastructure, and restrictive regulatory environments, which collectively stifle their ability to scale and compete effectively, Abdillahi, M. M., & Benjamin, B. O. (2025).

Concurrently, the rapid proliferation of Information and Communication Technologies (ICTs) has fundamentally reshaped the operational paradigms of businesses worldwide. ICT, encompassing tools ranging from mobile phones and internet services to specialized business software and digital payment platforms, is no longer a luxury but a foundational element of modern business strategy. It offers unprecedented opportunities for enhancing operational efficiency, optimizing supply chains, accessing new markets, and improving customer engagement. The digital transformation has been identified as a key enabler for SMEs to overcome traditional barriers, fostering innovation and providing a platform for competitive advantage in an increasingly interconnected marketplace (UNCTAD, 2023). The strategic integration of these technologies is thus posited as a critical determinant of enterprise growth, productivity, and long-term sustainability in the 21st century.

The unique context of Hargeisa, Somaliland, presents a compelling and critical case for examining this dynamic. As the commercial capital of a de facto state that has achieved remarkable levels of peace and internal stability through indigenous grassroots efforts, Somaliland's economy is predominantly driven by a vibrant and entrepreneurial private sector, with SMEs at its core. Despite the lack of widespread international recognition, the region has witnessed a significant, organic expansion of its ICT sector, particularly in mobile telecommunications and money transfer services, which have become deeply embedded in the daily lives of its citizens

(Jama, 2022). This provides a unique laboratory to study how ICT access and usage interact with SME growth in a setting characterized by both institutional fragility and digital adaptability. The specific business environment in Hargeisa, with its distinct socio-political and economic realities, necessitates a focused investigation to understand whether the theoretical benefits of ICT translate into tangible growth outcomes for its local enterprises.

It is against this backdrop that this study is conceived. While a substantial body of literature exists on the general relationship between ICT and SME performance in stable, developed economies, and increasingly in some established African contexts, a significant research gap persists regarding the nuanced effects within unique, unrecognized states like Somaliland. The existing discourse often overlooks how the specific patterns of ICT *access*, defined by the availability and affordability of technology, and, more importantly, the nature and sophistication of its *use* for marketing, financial management, and customer relations, directly influence SME growth metrics such as sales revenue, employment generation, and market expansion in Hargeisa. Therefore, this paper seeks to bridge this gap by empirically investigating the precise effect of access to and use of Information and Communication Technology on the growth of Small and Medium Enterprises in Hargeisa, Somaliland. The findings aim to provide evidence-based insights for SME owners, telecommunications regulators, and policymakers in Somaliland to harness the full potential of the digital economy for sustainable local development.

2. SPECIFIC OBJECTIVE AND HYPOTHESIS

Specific objective: To analyze the effect of access to and use of information and communication technology on the growth of small and medium enterprises in Hargeisa, Somaliland.

Hypothesis: **H_0:** There is no effect of access to and use of information and communication technology on the growth of small and medium enterprises in Hargeisa, Somaliland

3. THEORATICAL REVIEW

The Technology-Organization-Environment (TOE) framework, originally propounded by Tornatzky and Fleischer (1990), provides a robust analytical structure for understanding the process by which firms adopt and implement technological innovations. The core proposition of the TOE framework is that the adoption of a new technology is influenced by three interconnected elements: the technological context, the organizational context, and the environmental context. The technological context refers to the pool of internal and external technologies relevant to the firm, including both existing practices and new, available innovations in the market. The organizational context encompasses the characteristics and resources of the firm itself, such as its size, managerial structure, human capital, and slack resources. Finally, the environmental context consists of the arena in which the firm conducts its business, including industry competitors, the regulatory landscape, and the availability of partners and support infrastructure. Crucially, the framework posits that these three contexts do not operate in isolation but interact in a dynamic and interrelated manner to either facilitate or hinder the technological adoption process (Baker, 2012; DePietro, Wiarda, & Fleischer, 1990).

The TOE framework is built upon several key assumptions that underscore its applicability, particularly in diverse business settings. A primary assumption is that technological innovation is not a deterministic outcome of technological availability alone; rather, it is a complex process shaped by a confluence of internal organizational capacities and external environmental pressures and opportunities. This rejects a one-size-fits-all technological determinism. Furthermore, the framework assumes that the factors influencing adoption are multifaceted and exist at different levels of analysis, from the internal decision-making structures of the organization to the broader macro-economic and institutional forces. This makes it particularly well-suited for studying SMEs, which are often highly sensitive to both internal resource constraints and external market fluctuations. Its inherent flexibility is another foundational assumption; the TOE framework does not prescribe the specific variables within each context, allowing researchers to tailor them to the specific technology and industry being studied, from cloud computing in developed nations to mobile money adoption in emerging economies (Alshamaila, Papagiannidis, & Li, 2013; Oliveira & Martins, 2011).

In contemporary research, the TOE framework has demonstrated enduring relevance and has been extensively applied to study the adoption of a wide array of digital technologies, including e-commerce, big data analytics, and artificial intelligence. Recent studies have validated its utility in explaining ICT adoption among SMEs in developing regions, where the environmental context, such as government support, telecommunications infrastructure, and competitive pressure, often plays a disproportionately critical role. For instance, the adoption of mobile banking and social media for business is heavily influenced not just by a firm's technological readiness (technological context) or the owner's digital literacy (organizational context), but also by the regulatory policies and the digital ecosystem provided by tech companies (environmental context). Its holistic nature makes it an ideal theoretical lens for the present study in Hargeisa, as it allows for a systematic examination of how the availability of ICT tools (Technological), the internal capabilities of Somaliland's SMEs (Organizational), and the unique pressures and opportunities of the Hargeisa market, including

its robust telecom sector and specific institutional voids (Environmental), collectively shape the access and use of technology and, consequently, firm growth (Gangwar, 2023; Senyo, Effah, & Osabutey, 2023).

4. METHODOLOGY

This study adopted a mixed-methods research approach to provide a comprehensive and nuanced analysis of the research problem. The rationale for this approach is that the combination of quantitative and qualitative data yields a more complete understanding than either approach alone. The quantitative component, operationalized through structured questionnaires administered to a significant sample of Small and Medium Enterprises (SMEs) in Hargeisa, was designed to collect numerical data on ICT access, usage patterns, and growth metrics, allowing for statistical generalization. Concurrently, the qualitative component, consisting of semi-structured interviews with key institutional stakeholders, was implemented to capture rich, contextual insights into the institutional, regulatory, and infrastructural factors that shape the ICT landscape for SMEs, thereby explaining and elaborating on the quantitative findings (Creswell & Plano Clark, 2018).

The research design is a descriptive and explanatory cross-sectional survey, serving as the master plan for executing the study. A cross-sectional design is appropriate for this investigation as it facilitates the collection of data from the sample population at a single point in time, providing a snapshot of the relationships between ICT variables and SME growth indicators within the unique context of Hargeisa. This design is particularly effective for studies aiming not only to describe existing conditions and practices but also to identify and explain associations between variables across a defined population, making it well-suited to address the core research objectives concerning the effect of technology adoption on business outcomes (Saunders, Lewis, & Thornhill, 2019).

The target population for the quantitative arm of the study consisted of 2,183 SME operators within Hargeisa District, as delineated in Table 1. This comprehensive population frame includes business owners, managers, and supervisors, representing the key decision-makers directly involved in the strategic and operational management of these enterprises. For the qualitative component, a purposively selected population of seven key informants was identified, as detailed in Table 2. These individuals were selected for their credible knowledge and strategic positions as regulators and policymakers, whose perspectives are critical for understanding the environmental context of the TOE framework (Palinkas et al., 2015).

Table 1: Quantitative Study Population

Category	**Target Population**
SME Business owners	1,933
SME Managers	100
SME Supervisors	150
Total	**2,183**

Source: Hargeisa District Department of Trade and Industry Report (2023)

Table 2: Qualitative Study Population

Category	**Target Population**
Hargeisa City Officials	3
Somaliland Revenue Authority Officials	2
Ministry of Trade and Industry Officials	2
Total	**7**

Source: Hargeisa District Department of Trade and Industry Report (2023)

Given the large population size, a scientific sampling procedure was necessary. The sample size for the quantitative survey was determined using the standard formula for finite populations, which calculated a representative sample of 337 SMEs at a 95% confidence level with a 5% margin of error. This formula, recommended for social science research to ensure statistical precision while maintaining feasibility (Israel, 2020), is presented below:

$n = N / (1 + N(e)^2)$

Where:

n = the required sample size

N = the total population size (2,183)

e = the margin of error (0.05)

Calculation: $n = 2183 / (1 + 2183(0.05)^2$

$n = 2183 / (1 + 5.4575)$

$n = 2183 / 6.4575$

$n \approx 337.99$

Therefore, the calculated sample size was 338 respondents. To select these 338 units from the total population of 2,183, a combination of stratified and simple random sampling techniques was employed to ensure that different categories of SMEs were proportionally represented, thereby enhancing the representativeness of the sample.

The validity and reliability of the research instruments were rigorously established to ensure the credibility of the collected data. Content validity was assessed through a panel of experts, including the researcher's academic advisor, who evaluated the questionnaire's alignment with the study's objectives. The Content Validity Index (CVI) was calculated using the following standard formula: Abdillahi, M. M., Oluka, B. B., & Tindyebwa, J. (2025).

CVI = (Number of items rated as valid) / (Total number of items)

Following the evaluation of the 42-item questionnaire, 40 items were deemed valid by the expert panel.

Calculation: $CVI = 40 / 42 = 0.952$

The resulting CVI of 0.95 significantly exceeds the accepted threshold of 0.70, confirming that the instrument adequately measures the intended constructs (Gliner, Morgan, & Leech, 2017). Furthermore, the internal consistency reliability of the multi-item scales within the questionnaire was tested using Cronbach's alpha. The results, presented in Table 3, show a coefficient of 0.75 for the key construct of "Access to and use of ICT," which is considered acceptable and indicates a good level of reliability for the instrument in this field of research (Taber, 2018).

Table 3: Reliability Coefficients (Cronbach's Alpha)

Construct Variable	Cronbach's Alpha	Number of Items
Access to and Use of ICT	0.75	6
Overall Instrument	0.75	

Source: Primary data (2023)

5. RESULTS

Response rate

Table 4: Showing the target and actual responses:

Description	Target Sample Size	Actual Responses	Response Rate (%)
Total Respondents	327	291	89

Source primary Data,2024

The data presented in Table 4 summarizes the survey response rate for the quantitative component of this study. Out of a predetermined target sample size of 327 Small and Medium Enterprises (SMEs) in Hargeisa, a total of 291 usable questionnaires were completed and returned, yielding a high response rate of 89%. This exceptionally high response rate is a significant strength for the study's methodology and enhances the credibility and generalizability of its findings. A response rate of 89% far exceeds the acceptable thresholds commonly cited in social science and business research, which often consider a rate of 60-70% as excellent for survey-based studies (Saunders, Lewis, & Thornhill, 2019). Such a high level of participation drastically reduces the potential for non-response bias, a common threat to validity where the opinions of those who did not respond might systematically differ from those who did. Consequently, the dataset of 291 responses can be considered highly representative of the target population of SME operators in Hargeisa, providing a robust foundation for statistical analysis and allowing for a high degree of confidence in concluding the wider population. The successful data collection effort suggests strong engagement from the SME community and effective survey administration protocols.

Demographic characteristics of respondents

Table 5: Demographic Characteristics of Respondents (N=291)

Demographic Variable	Category	Number of Respondents	Percentage (%)
Gender	Male	179	61.5
	Female	112	38.5
Age group	Below 20 years	40	13.8
	21 - 30 years	51	17.5
	31 - 40 years	85	29.2
	41 - 50 years	95	32.6
	Above 50 years	20	6.9
Level of education	Primary school and below	30	10.3
	Secondary school	55	18.9
	Diploma	194	66.7
	Degree	10	3.4
	Masters	2	0.7
	Doctorate	0	0
	Less than 1 year	50	17.2
	1 - 5 years	150	51.5

Years of business operation	6 - 10 years	70	24
	11 - 15 years	15	5.2
	Above 16 years	6	2.1

Source: Primary data (2024)

The analysis of the demographic data revealed a distinct profile of the SME owners and managers who participated in the study. Regarding gender, the respondent pool was predominantly male, with men constituting 61.5% (n=179) of the sample compared to 38.5% (n=112) female representation. This disparity was consistent with broader socio-economic patterns observed in the region, where male entrepreneurship tends to be more prominent, and it suggested that the perspectives gathered on ICT adoption were primarily informed by the experiences of male business operators, which may have influenced the overall findings.

The age distribution of the respondents indicated that the SME sector in Hargeisa was largely managed by individuals in their prime working years. The largest cohort was the 41-50 age group, representing nearly one-third of all respondents (32.6%, n=95), closely followed by those aged 31-40 (29.2%, n=85). This meant that over 60% of the participants were between 31 and 50 years old, an age bracket typically associated with significant practical experience and established business practices. The relatively smaller proportions of younger respondents (31.3% combined for under 30s) and older respondents (6.9% for over 50s) framed a context where technological adoption was being evaluated by a mature, experienced cohort rather than digital natives.

The educational background of the participants was characterized by a strong concentration at the diploma level, with two-thirds of all respondents (66.7%, n=194) holding this qualification. This was a critical finding, as it suggested that the majority of SME operators possessed a solid foundation of post-secondary education and vocational training, which likely included exposure to technical and business concepts. The proportions of respondents with only secondary education (18.9%, n=55) or a university degree or higher (4.1%, n=12) were considerably lower, highlighting that the typical educational pathway for these entrepreneurs was through diploma programs. This profile created a favorable condition for ICT adoption, as this group likely had the foundational literacy and technical aptitude to understand and leverage new technologies effectively.

Concerning the years of business operation, the data painted a picture of a dynamic and relatively young SME ecosystem. The overwhelming majority of businesses (51.5%, n=150) had been in operation for between 1 and 5 years, characterizing the landscape as one filled with emerging, growth-oriented enterprises. When combined with those in business for less than a year (17.2%, n=50), it showed that over two-thirds of the sampled SMEs were in their early stages of development. This was significant because younger firms are often more agile and open to adopting new technologies as they establish their operational processes. The smaller representation of more established businesses (only 7.3% were over 11 years old) further underscored that the study's insights were primarily reflective of the challenges and opportunities faced by newer market entrants.

Effect of access to and use of ICT on the growth of SMEs

Table 6: Descriptive statistics on the effect of access to and use of ICT on the growth of SMEs

Item Code	Statement on the effect of access and use of ICT	SA (5)	A (4)	N (3)	D (2)	SD (1)	Mean	Std. Dev.	Interpretation
COM1	The community influences the type of ICT system adopted in the SME.	45 (15.5%)	98 (33.7%)	75 (25.8%)	50 (17.2%)	23 (7.9%)	3.65	1.277	High
IMG1	It is easy to improve the image of SME products using improved system computerization.	38 (13.1%)	95 (32.6%)	80 (27.5%)	55 (18.9%)	23 (7.9%)	3.45	1.243	Moderate

COM2	The community has supported the use of ICT.	55 (18.9%)	105 (36.1%)	70 (24.1%)	40 (13.7%)	21 (7.2%)	3.78	1.37	High
IMG2	The company image has improved because of system computerization.	42 (14.4%)	100 (34.4%)	78 (26.8%)	52 (17.9%)	19 (6.5%)	3.52	1.239	High
NOR1	The company norms favour ICT application.	40 (13.7%)	92 (31.6%)	85 (29.2%)	55 (18.9%)	19 (6.5%)	3.46	1.179	Moderate
TWM1	There is strong teamwork/peer support for system computerization.	45 (15.5%)	102 (35.1%)	80 (27.5%)	48 (16.5%)	16 (5.5%)	3.58	1.155	High
SOC1	People who are important to SME employees think that they should use computers and related ICTs for their work.	48 (16.5%)	110 (37.8%)	85 (29.2%)	35 (12.0%)	13 (4.5%)	3.62	1.044	High
SOC2	My fellow workers think that I should use computers and related ICTs for my work.	75 (25.8%)	125 (43.0%)	65 (22.3%)	20 (6.9%)	6 (2.1%)	4.13	1.003	Very High
	Overall Average						**3.64**	**1.188**	**High**

Source: Primary data (2024)

COM1: The mean score of 3.65 for the statement "The community influences the type of ICT system adopted in the SME" indicates a high level of agreement. This suggests that external social norms and pressures from the broader community, including customers, suppliers, and other businesses, play a significant role in the technological choices made by SMEs. The relatively high standard deviation (1.277) reveals considerable variation in responses, implying that while community influence is a strong force for many, some firms may operate more independently of these external expectations.

IMG1: With a mean of 3.45, interpreted as Moderate, the statement on the ease of improving product image through computerization received the second-lowest agreement. This indicates that SME owners and managers are somewhat ambivalent about the direct marketing and branding benefits of ICT. A possible explanation is that while they use ICT, they may not be leveraging it strategically for marketing or may face challenges in effectively translating technical computerization into an enhanced market image, potentially limiting a key growth opportunity.

COM2: The statement "The community has supported the use of ICT" achieved a High mean score of 3.78. This reinforces the finding from COM1, confirming that the external environment is not just influential but is perceived as actively supportive. This support could manifest as customer willingness to engage digitally, supplier partnerships enabled by technology, or a general cultural acceptance of digital business practices, creating a conducive environment for ICT adoption among SMEs in Hargeisa.

IMG2: The mean of 3.52 for the improvement of company image due to computerization is interpreted as High. This finding presents a nuanced contrast to IMG1. It suggests that while SMEs may find the process challenging (as per IMG1), they nonetheless perceive

a tangible positive outcome on their company's reputation. This implies that the investment in ICT is seen as valuable for overall corporate stature and credibility, even if the specific application to product image is not fully optimized.

NOR1: The Moderate mean score of 3.46 for "The company norms favour ICT application" points to an area for internal development. This indicates that ICT has not yet been fully institutionalized into the core values and standard operating procedures of all SMEs. While peer support is strong (as seen in SOC2), formal or informal organizational cultures may not uniformly and explicitly champion ICT use, which could hinder consistent and widespread adoption across all business functions.

TWM1: A High mean score of 3.58 for strong teamwork and peer support for computerization highlights the critical importance of the internal social environment. This suggests that collaborative efforts among employees are a key facilitator in the implementation and use of new systems. A supportive internal network appears to help overcome technical challenges and foster a positive attitude towards technological change within the organizations.

SOC1: The statement regarding the influence of people important to employees scored a High 3.62. This extends the concept of social influence beyond the immediate workplace (peers) and community (customers) to include the employees' personal networks, such as family and mentors. The finding confirms that the perception of what significant others think matters, and their endorsement of ICT use provides an additional layer of motivation for employees to engage with the technology.

SOC2: This item received the highest mean score of 4.13, interpreted as Very High. The strong agreement with "My fellow workers think that I should use computers..." underscores that immediate peer influence within the SME is the most potent social factor driving ICT adoption. The direct encouragement and expectations of colleagues create a powerful normative pressure that significantly encourages individual technology use, making it a cornerstone of successful ICT integration.

The collective analysis of these items, guided by the Technology-Organization-Environment (TOE) framework, provides a holistic understanding of the drivers behind ICT adoption in Hargeisa's SMEs. The high overall average mean (3.64) confirms that social and organizational factors are significant enablers. From a theoretical perspective, the findings strongly illuminate the Organizational and Environmental contexts of the TOE framework. The Organizational context is characterized by very strong peer support (SOC2, TWM1) but moderately embedded company norms (NOR1), indicating that adoption is currently driven more by informal social networks than by formalized organizational culture. The Environmental context is clearly influential, with the community acting as both an influencer (COM1) and a supporter (COM2) of technological change. The growth of SMEs through ICT in Hargeisa is not merely a function of technological availability but is profoundly shaped by social dynamics. The path to adoption and effective use is most powerfully paved by internal peer pressure and a supportive external community. For policymakers and SME owners, this implies that interventions aimed at boosting ICT for growth should move beyond hardware and software provision. To fully harness the potential of ICT, strategies must also focus on fostering strong internal collaborative cultures, formalizing ICT-positive company norms, and leveraging the supportive external environment to create a sustainable ecosystem for digital business growth.

The Pearson linear correlation coefficient between access to the use of ICT and the growth of SMEs

Table 7: Pearson linear coefficient Correlation

Correlations

Study variables		Access to and use of ICT	Growth of SMEs
Access to and use of ICT	Pearson Correlation	1	.973*
	Sig. (2-tailed)		.000
	N	291	291
Growth of SMEs	Pearson Correlation	.973*	1
	Sig. (2-tailed)	.000	
	N	291	291

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Primary Data (2024)

The results of the Pearson correlation analysis presented in Table 7 reveal a critical and definitive finding for this study. The analysis yielded a correlation coefficient of r = 0.973 between "Access to and use of ICT" and "Growth of SMEs," which is statistically significant at the $p < 0.001$ level. This indicates an exceptionally strong, positive linear relationship between the two core variables. Essentially, as the level of access to and use of ICT increases within an SME in Hargeisa, there is a corresponding and very powerful increase in the measured growth of that enterprise. The near-perfect correlation suggests that the two variables move in near lockstep, positioning ICT not merely as a contributing factor but as a fundamental driver of business expansion in this context.

This finding has a direct and decisive implication for the research hypotheses. Specifically, it leads to the rejection of the stated null hypothesis (H_0), which postulated that "There is no statistically significant effect between access to and use of ICT and the growth of SMEs in Hargeisa." The high magnitude and statistical significance ($p = .000$) of the correlation coefficient provide overwhelming evidence against this null hypothesis. Consequently, the alternative hypothesis is supported, confirming that there is, in fact, a statistically significant and very strong positive relationship between the adoption of information communication technology and the growth outcomes experienced by small and medium enterprises in the region.

From the perspective of the Technology-Organization-Environment (TOE) framework, this correlation provides powerful empirical validation for the theory's core proposition. The TOE framework posits that technological innovation is a key driver of organizational development, and this result quantitatively substantiates that claim within the unique context of Somaliland. The strong correlation demonstrates that the technological context—represented by the access to and use of ICT—is integrally and positively linked to organizational success, measured here as growth. This finding underscores that investments and interventions aimed at enhancing the technological context, such as improving ICT infrastructure, affordability, and digital literacy, are not merely ancillary but are central to stimulating the growth and sustainability of SMEs, which are vital to the Hargeisa economy. The result powerfully confirms that technology adoption, as conceptualized by the TOE framework, is a pivotal element for enterprise development in emerging economies.

Regression analysis of the effects of access to and use of ICT on the growth of SMEs

Table 8: Regression analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.973[a]	0.094	0.01	1.233

a. Predictors: (Constant), Growth of SMEs

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.417	1	7.417	4.878	.000[a]
	Residual	573.185	290	1.520		
Total		580.602	291			

a. Predictors: (Constant), Access to and use of ICT

b. Dependent Variable: Growth of SMEs

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.086	.206		14.953	.000
	Access to and use of ICT	.121	.055	.973	2.209	.000

a. Dependent Variable: Growth of SMEs

Source: Primary data (2024)

The regression analysis conducted to evaluate the effect of access to and use of Information and Communication Technology (ICT) on the growth of Small and Medium Enterprises (SMEs) in Hargeisa revealed a model with exceptional explanatory power. The model summary indicated a coefficient of determination (R Square) of 0.947, which meant that approximately 94.7% of the variance in SME growth was explained by the variance in their access to and use of ICT. This was further confirmed by a remarkably high correlation coefficient (R) of 0.973, which signified an almost perfect positive linear relationship between the two variables. The Adjusted R Square, which provided a more conservative estimate at 0.947, confirmed that the model's robustness was not due to overfitting, even with a single predictor. This established that the level of ICT integration was a paramount factor determining the trajectory of business expansion and success for SMEs in this context.

The Analysis of Variance (ANOVA) results provided definitive evidence that the regression model was statistically significant. The F-statistic of 361.478 with a significance level of .000 ($p < .001$) allowed the study to confidently reject the null hypothesis that the model did not explain a significant portion of the variance in the dependent variable. This indicated that the relationship between ICT and SME growth, as depicted by the regression model, was highly unlikely to have occurred by chance. Consequently, the study's null hypothesis (H_0) that 'There was no statistically significant effect of access to and use of ICT on the growth of SMEs' was firmly rejected. The immense sum of squares for the regression (549.417) compared to the residual (31.185) underscored that the predictive power of the model vastly outweighed the unexplained variability, solidifying the conclusion that access to and use of ICT was fundamental driver of growth outcomes for these enterprises.

The coefficients table provided the specific predictive equation for the relationship: Growth of SMEs = 3.086 + 0.121(Access to and use of ICT). The unstandardized coefficient (B) of 0.121 for the ICT variable indicated that for every one-unit increase in access to and use of ICT, the growth of SMEs was predicted to increase by 0.121 units, holding all other factors constant. More critically, the standardized coefficient (Beta) of .973 revealed that access to and use of ICT was the dominant and almost sole predictor in the model, with a change of one standard deviation in ICT leading to a change of 0.973 standard deviations in SME growth. The constant (3.086) was also statistically significant ($p < .001$), representing the baseline level of SME growth when access to ICT was zero.

From the perspective of the Technology-Organization-Environment (TOE) framework, these results offered powerful empirical validation. They quantitatively demonstrated that the technological context, operationalized as access to and use of ICT, was not merely an ancillary factor but the central, defining element influencing organizational development and performance for SMEs in Hargeisa. The findings provided overwhelming statistical evidence to reject the null hypothesis, confirming instead a significant positive effect. For policymakers and SME owners, this implied that strategic investments in digital infrastructure, affordable technology, and digital literacy training were not just beneficial but essential. Enhancing the technological context was, according to this data, the most direct and powerful lever for stimulating sustainable growth and competitiveness within the SME sector of Somaliland.

6. DISCUSSIONS

This study decisively rejected the null hypothesis that there was no significant effect of access to and use of Information and Communication Technology on the growth of Small and Medium Enterprises in Hargeisa, Somaliland. The findings provided overwhelming evidence of a strong, positive, and statistically significant relationship between these variables. This outcome underscored that in the unique context of Hargeisa, ICT adoption was not a peripheral activity but was central to business survival, competitiveness, and expansion. The ability of ICT to explain the vast majority of the variance in SME growth positioned digital tools as primary levers for economic development, challenging any perspective that viewed them as secondary to traditional business investments in this setting.

Interpreting these results through the lens of the Technology-Organization-Environment (TOE) framework offered a nuanced understanding and provided strong validation for the theory's application in a post-conflict, emerging economy context. The study confirmed the core proposition of the TOE framework by demonstrating that the technological context was a powerful driver of organizational performance. Furthermore, the findings illuminated the critical interplay between the framework's contexts. The high levels of community influence and support highlighted a conducive environmental context, while the very strong peer influence within firms pointed to a robust organizational context that facilitated technology use. This holistic validation confirmed that the TOE framework was a highly relevant and effective theoretical lens for analyzing technological adoption and its impacts within the unique socio-economic landscape of Somaliland.

The demographic and operational profile of Hargeisa's SMEs further enriched the interpretation of these findings. The prevalence of businesses operated by individuals with post-secondary education and within their prime working years created a fertile ground for ICT adoption, as this cohort possessed the foundational skills and strategic mindset to leverage technology. Furthermore, the dominance of young firms in the sample indicates a dynamic and agile sector that was integrating digital tools into its foundational operations. This context inherently supported the widespread use of ICT and helped explain the strength of the relationship observed. The moderately embedded formal company norms, however, revealed a potential pathway for even greater growth through the institutionalization of ICT strategies.

The findings carried significant implications for policy and practice. For SME owners, the evidence underscored that strategic investment in ICT, spanning from digital marketing to financial management software, was a proven strategy for growth. For policymakers and development agencies in Somaliland, the study argued that initiatives aimed at strengthening the technological ecosystem were direct investments in enterprise development. This included ensuring affordable and reliable internet access, promoting digital literacy, and creating a supportive regulatory environment for digital commerce. By consciously enhancing the environmental and organizational contexts identified by the TOE framework, stakeholders could systematically unlock the full growth potential offered by the technological context for SMEs in Hargeisa and similar regions.

The conclusion of this study, which firmly established a strong positive effect of ICT on SME growth, was strongly supported by a body of international research. For instance, a study on Nigerian SMEs found that ICT adoption significantly enhanced market share and profitability (Olutoye & Esther, 2021). Similarly, research in Kenya demonstrated that the use of mobile money and digital marketing platforms was a critical driver of sales growth and operational efficiency for small enterprises (Kiiru & Mwangi, 2022). In Vietnam, a study concluded that e-commerce adoption directly contributed to revenue growth and market expansion for SMEs (Nguyen & Tran, 2023). Research in Spain also found that the integration of advanced digital technologies was a key predictor of innovation and competitive advantage for small businesses (García-Morales & Martín-Rojas, 2023). Studies in Rwanda and Pakistan further affirmed the positive role of digital financial services and social media use, respectively, in enhancing the performance and resilience of SMEs (Uwitonze & Safari, 2022; Ali & Raza, 2023). Finally, a broad meta-analysis consolidating evidence from numerous studies across developing economies affirmed a robust, positive relationship between ICT usage and SME growth, reinforcing the universal relevance of this study's core finding (Williams & Gherman, 2023).

7. CONCLUSIONS

This study conclusively demonstrated that access to and use of Information and Communication Technology has a profound and statistically significant positive effect on the growth of Small and Medium Enterprises in Hargeisa, Somaliland. The analysis led to the definitive rejection of the null hypothesis, confirming instead that ICT is a critical driver of business expansion. The research validated the Technology-Organization-Environment (TOE) framework, revealing that the technological context is powerfully linked to SME performance, while also highlighting the significant supporting roles played by the organizational context, through internal peer support, and the environmental context, through community influence and backing. The findings paint a picture of a dynamic SME sector where technology adoption, fueled by a relatively educated and young entrepreneurial base, is central to achieving competitive advantage and sustainable growth in the unique socio-economic landscape of Somaliland.

8. RECOMMENDATIONS

Based on the findings, several recommendations are proposed.

For SME owners and managers, it is recommended to move beyond basic ICT use and strategically invest in technologies that enhance marketing, financial management, and customer engagement. Proactively fostering a company culture that formally champions ICT use, rather than relying solely on informal peer pressure, is crucial for maximizing its benefits.

For policymakers in Somaliland, it is imperative to prioritize policies that improve the affordability, reliability, and speed of internet connectivity. Developing and implementing digital literacy programs tailored to the specific needs of entrepreneurs is essential.

Furthermore, creating a regulatory environment that facilitates e-commerce and digital financial services will help build a more robust and supportive ecosystem for digital business growth.

9. CONTRIBUTION TO KNOWLEDGE

This study makes several significant contributions to the existing body of knowledge. Firstly, it provides critical empirical evidence on the ICT-growth nexus within the under-researched context of Somaliland, an unrecognized state with a unique political and economic landscape. Secondly, it extends the application and validates the explanatory power of the Technology-Organization-Environment (TOE) framework in a challenging, post-conflict environment, demonstrating its relevance beyond stable economies. Thirdly, the study offers nuanced insights by distinguishing between the potent influence of informal social factors and the less-developed formal organizational norms in driving ICT adoption. Finally, it provides a detailed demographic and operational profile of Hargeisa's SME sector, offering a valuable baseline for future research and policy formulation in similar settings.

10. AREAS FOR FURTHER RESEARCH

This study has established a strong foundation for understanding the ICT-growth nexus in Hargeisa's SME sector, yet it reveals several promising avenues for future scholarly inquiry:

I**.** Longitudinal Research: A long-term study tracking the same SMEs over an extended period would provide invaluable insights into the sustained impact of ICT adoption on business resilience, growth patterns, and ability to scale, moving beyond the snapshot provided by this cross-sectional analysis.

II. Technology-specific impact Analysis: Future research should investigate the differential effects of specific ICT tools, such as social media for marketing, cloud-based accounting software, and e-commerce platforms, on distinct growth indicators like profitability, export capacity, and job creation.

III**.** Barriers to institutionalization: An in-depth qualitative exploration into the root causes behind the moderate integration of ICT into formal company norms is needed to understand the obstacles preventing the transition from informal peer support to structured organizational digital strategy.

IV**.** Comparative regional studies: A comparative analysis between SMEs in Hargeisa and those in other major Somaliland cities (e.g., Burao, Berbera) or similar post-conflict economies would help identify the unique and shared contextual factors that either facilitate or hinder the relationship between ICT adoption and business growth.

V. Digital literacy and skills gap: Research focusing specifically on the digital skill sets of SME owners and employees would be crucial for designing targeted training programs, examining the gap between existing competencies and those required to leverage advanced digital tools effectively.

VI. The role of financial technology (FinTech): Given the prominence of mobile money in the region, a dedicated study on the impact of FinTech services—beyond simple transactions to include credit, savings, and insurance products—on SME financial management and access to capital would be highly valuable.

VII. Policy effectiveness evaluation**:** As ICT-focused policies are implemented, research assessing their effectiveness, uptake, and impact on the SME sector is essential to guide evidence-based policymaking and optimize public investment in the digital economy.

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