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The Effect of ICT Infrastructure on Growth of Small and Medium Enterprises in Hargeisa, Somaliland

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Abstract **Review Article**

This Research investigated the effect of ICT infrastructure on SMES growth in Hargeisa District, Somaliland. The primary objective was to assess how various components of ICT infrastructure –including access to ICT tools, technical support, staff ICT training, and policy implementation- impact the operational and financial growth. The Study uses a quantitative methodology approach using structured questionnaires administered a sample of 327 SME operators, of which 291 responded, yielding an 89% response rate. The findings shows that most SMEs have access to basic ICT tools and support with an average mean score of 3.81 on a 5-point Like-rt scale, indicating a moderately high level of ICT infrastructure. Management support in providing technical ICT resources scored the highest (mean = 4.10), while the effective utilization of ICT policy scored the lowest (mean = 3.59), suggesting areas for policy improvement. The study comes to an end that ICT infrastructure plays a significant role in enhancing SME growth by improving efficiency, communication, and access to markets. It recommends increased investment in ICT resources, regular staff training, and the effective implementation of ICT policies to foster sustainable growth among SMEs in Somalia.

Keywords: ICT infrastructure, SME growth, Technology adoption, Business development.

INTRODUCTION

In the transition of business and human societey from the information technology age to the knowledge age, information and communication technology has become more prevalent and has grown more dynamically than at any other time in human industry. In 2022 oladipupo et el. Business is driven by ICT, which continues to have a important Effect on many aspects of our lives, including the economic, social, technological, regulatory, political and environmental.

In competitive business climate ICT integration in SMES helps manage shifting demands, innovative new goods and processes and develop new applications, all of which improve corporate permanence (oganga 2022).

The worldwide business and industry trend of the twenty-first century is changing quickly.

Traditional activities are giving away to knowledge and information-based on economy in the global commerce system. These days SMES and big corporations alike are looking for methods to boost their productivity and strengthen their competitive position (premkmar,2023).

ICT is thought to be the most economical way for businesses to expend their markets and compete with larger corporations in bragging clients to their information, services, and goods.

ICT plays a major role in helping SMES build the infrastructure they need to deliver the correct kinds of information at the right time (Ghobakhloo 2022).

ICT contributes significantly to the expansion of the global economy, better access to education and healthcare and a higher value of share added than employment, which reflects the enterprises comparatively high capital investment and output.

The emergence of the internet has altered the nature of international commerce. Over the last 15 years, 10%of GDP growth has come from the internet.

SMES have always been essential to Somaliland's regional job and income creation, serving as a safety net during economic downturns. Thorough the creation of numerous job possibilities, they have contributed to the reduction of growth gaps across regions and between rural and urban areas. However, SMES full potential in Somaliland's development has not been fulfilled due to a number of obstacles, and their

growth both locally and internationally has been disappointing (Jaimin, 2016). for a variety of reasons, SMES are highly prized, particularly emerging nations.

LITERATURE REVIEW

Theoretical Review

This research will apply the Diffusion of innovation, resource based view theory and technology acceptance model.

2.1.1 Diffusion of Innovation Theory

Everett Rogers created the Diffusion of innovation theory in 1962 and it is a well-known frame work for comprehending how novel concepts, inventions or technology proliferate thorough civilizations. The idea describes the various stages of adoption that people or organizations go through from not knowing about an innovation finally incorporating it into their operations, innovators, early adopters, early majority, late majority and laggards are the five main adopter categories that Rogers defined.

The different rates at which people or organizations accept new innovations are represented by these grouping.

2.1.2 Resource Based View Theory

Jay Barney created the resource based view theory idea in the early 1990s. The significance of a company's internal resources and talents in gaining a competitive edge as highlighted in Barney's work. According to the notion businesses can attain better performance if they have resources that are rare. Valuable, unique and non-replaceable (commonly referred to as the VRIN framework). These resources could be intangible (such intellectual property, brand reputation and organizational culture) or concrete (like infrastructure and technology).

Businesses can obtain long term competitive advantage that are hard for rivals to match by efficiently allocating and managing these resources. The RBV theory provides a useful lens thorough which to see how local firms might use IT to promote a growth and competitive advantage in the context of SMES expansion and adoption of IT in Hargeisa District

2.1.3 Technology Acceptance Model

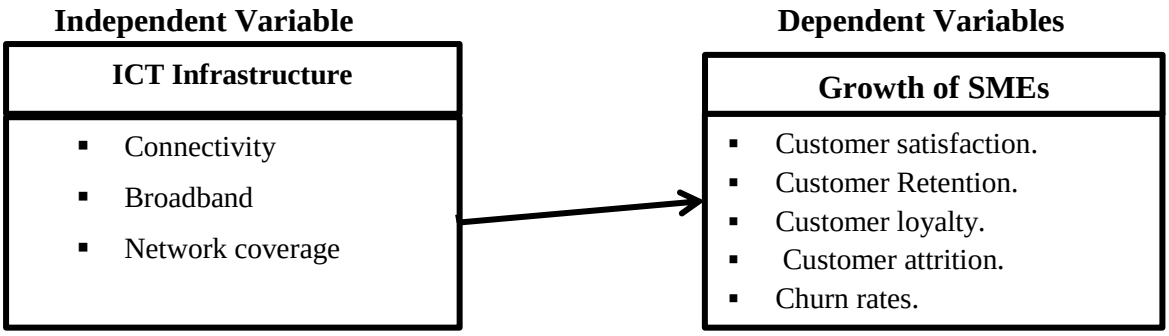
This model, which Davies proposed in 2019, was created to predict both user acceptance and the organizations adoption of information technology. Using particular services or technology to explain attitudes is the aim of the TAM (Bertrand&Bouchard 2018). the technology acceptance paradigm is a powerful, robust and legitimate paradigm, according to numerous meta-analyses by emphasizing two key-elements-perceived utility and ease of use-the TAM promotes the uptake and expansion of information technology among SMES in Hargeisa.

Conceptual Review

Information technology adoption

Information technology (IT) adoption is a multifaceted process integral to understanding the integration of new digital technologies into various facets of life.

Conceptual Framework



EMPIRICAL LITERATURE REVIEW

2.3.1 ICT infrastructure and Growth

ICT infrastructure and technology use are positively correlated, claim the developers of the ICT infrastructure model. When ICT is not provided, ICT infrastructure predicts intention in previous models like TPB and tools of ICT. So that there is no significant correlation Between ICT infrastructure and behavioral intensions in Hargeisa Somaliland.

ICT infrastructure plays a complicated role in technology adoption decisions that are influenced by many different factors individual behavior is influenced by ICT and access use through

three mechanisms: identification, internalization, and compliance.

METHODOLOGY

Research Approach

The research approach for this study was mixed method approach. comprehensive understanding of the research problem is achieved by qualitative interviews, through structured questionnaires. This data provides measurable insights into the level of IT adoption, types of IT tools used, and their impact on business performance (El-Saboni et al., 2009). On the other hand, qualitative methods, via in-depth interviews with SME owners and managers, offer detailed, contextual insights into the specific challenges and benefits associated with IT adoption, capturing personal experiences and nuanced factors that quantitative data alone cannot reveal (Rimmington et al., 2015).

3.2 Research Design

According to Kerlinger (1986), research design is the overall strategy that the researcher employs to try to a accomplish the goals of the study and discover for the answer to the questions that we formulated in light of the goals. Both a cross sectional and descriptive survey design were used in this investigation. These approaches are well-suited for addressing the research objectives and providing comprehensive insights into the adoption of ICT and its impact on the growth of SMEs in Hargeisa.

3.3 Study Population

The complete group from a which sample size was taken is referred to as the study population. Often, this population is too large to study in its entirety, making it impractical or impossible to include every member in the research (Bryman, 2022).

Table 1: Quantitative Study Population

Category	**Target population**
SME Business owners	1933
SME Managers	100
SME supervisors	150
Total	2183

Source: Department of trade and industry report for hargeisa distirct 2023

In this instance the study target study population was 2,190 SME operators in Somalia (Hargeisa district, Department of Trade, 2023)

Table 1: Qualitative Study Population

Category	**Target population**
Hargeisa city officials	03
Somalia Revenue Authority officials	02
Officials of Ministry of Trade, Industry and co-operatives	02
Total	**07**

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

3.4 Sample Size Determination

In **Croswell (2003),** a subset of people chosen from a broader group is called a sample. The study was consisting a population of 2,190 respondents from Hargeisa district, which the study will target who was sampled using both purposive and random sampling methods. To determine the sample size, the following formula was used, which is commonly employed in social science research:

Where: n = sample size N = total population size e = margin of error (commonly set at 0.05 for a 95% confidence level)

$$n = \frac{N}{1+N(e)^2} \qquad n = \frac{327}{1+327(0.05)^2} \qquad n = \frac{327}{1+327(0.0025)} \qquad n = 327$$

Thus, the sample size was 327 in this study.

3.5 Validity and reliability of the instrument

3.5.1 Validity

The validity was established through review by experts, and the researcher aims to achieve a validity coefficient of at least 70% (Gliner & Morgan, 2016). To ensure this, the researchers were seek input from an academic advisor with expertise in questionnaire design. Following the evaluation of the questionnaire, adjustments was made to align it with the study's objectives. The formula calculated the validity is:

$$CVI = \frac{\text{no of items declared valid}}{\text{total no of items}} \qquad \text{CVI} = 40/42 = 0.95$$

The instrument was valid if the CVI result is above 0.7.

3.5.2 Reliability

This is understood to be the degree to which a test yields comparable outcomes across multiple attempts(Bolarinwa). until independent observers concur on the replication of being able to use a certain instrument to produce consistent measurement, a general conclusion about the research cannot be made. For the objective of verifying the reliability of the study instrument, the cronbach alpha (a) ceoficient was found to be the most suitable reliability test.

cronbach alpha formula applied in the current investigation wil be as fellows:

Cronbach's alpha $\alpha = (N\times \bar{c})/(\bar{v}+(N-1)\bar{c})$ N= Population for the study $\bar{c}$ =Average covariance between items $\bar{v}$ =A average covariance

Table 3: Showing Cronbach's Alpha

Construct variable	Cronbach's Alpha	No. of items
ICT infrastructure	0.81	6
Access to and use of ICT	0.75	6
ICT Integration	0.88	6
Customer satisfaction	0.95	5
Customer retention	0.78	5
Customer attrition	0.89	5
Overall	**0.84**	

Results

Response rate

In this study, the target sample size was set at 327 respondents to ensure a analysis of the factors impacting the growth of SMEs. However, the actual number of responses collected totaled 291. This response rate represents approximately 89% of the target sample, indicating a strong level of participation among the intended respondents. Despite the shortfall from the target size, the collected data remains robust for analysis, offering valuable insights into the study's objectives.

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

4.3.1 The effect of ICT infrastructure and Growth of SMES.

ICT infrastructure was the study's independent variable, and the expansion of SMES was divided into eight questions. The five point Likert scale was used for each this questions. And respondents were asked to rate how much they agreed or disagreed with each one. SPSS was used to analyze the responses and the means are shown in the table.

Table 5: Descriptive statistics on Effect of ICT Infrastructure

ICT INFRASTRUCTURE	Mean	SDev
The staff members possess the fundamental skills and training required to use computers and associated ICT to complete tasks	3.88	1.262
Workshops are conducted to assist in integrating new ICT skills into the workforce	3.78	1.155
There is an ICT policy in MPL	3.68	1.365
The ICT Policy is effectively being utilized.	3.59	1.289
MPL'S management provides technical assistance to staff members on ICT related issues	4.10	1.003
The ICT Department has a sufficient number of employees	3.90	1.452
Recourses for using computers and related ICTS for work performance are accessible to MPL employees both at work and at home.	3.72	1.234
Average mean	3.81	1.25

Source: Primary Data, 2024

In the analysis of the relationship between ICT infrastructure and the growth of SMEs, several descriptive statistics were derived from responses to eight questions measured on a five-point Likert scale. The mean score for the statement "The employees have basic knowledge and training necessary to use computers and related ICTs to accomplish tasks" was 3.88, with a standard deviation of 1.262, indicating a relatively positive perception regarding employees' ICT training. The question regarding workshops held to enhance ICT skills yielded a mean of 3.78 and a standard deviation of 1.155, suggesting that while workshops are recognized, there may still be room for improvement. Respondents indicated a mean of 3.68 with a standard deviation of 1.365 regarding the existence of an ICT policy in the organization, demonstrating some awareness but also highlighting potential challenges.

The effectiveness of the ICT policy was rated lower, with a mean of 3.59 and a standard deviation of 1.289, underscoring challenges in its implementation. In contrast, the statement "The management of MPL gives technical support to employees on matters related to ICT" received the highest mean score of 4.10 and a standard deviation of 1.003, signifying strong management support for ICT-related issues. The adequacy of staffing in the ICT department was rated with a mean of 3.90 and a standard deviation of 1.452, indicating a general consensus that staffing levels are satisfactory, which is crucial for effective ICT operations.

Lastly, the availability of resources for employees to use computers and related ICTs for work performance resulted in a mean of 3.72 with a standard deviation of 1.234, reflecting a favorable view of resource accessibility.

Table 6: Descriptive statistics on Growth of SMEs

Growth of SMEs	Mean	Std. Deviation
Due to the difficult of switching cosmetic products are devoted to SMES	3.5871	1.17628
SMEs has excellent relationship with customers	3.2239	1.45073
SMEs are able to deliver the products and services that clients require	3.2736	1.41413
Customers believe there is little benefit to switching to alternative beauty products	3.2687	1.48575
Customers value SMEs because it has efficient service	3.2438	1.48502
Customers of SMEs like the quality of SMEs Products	3.1642	1.46216
Average mean	**3.29355**	**1.412345**

Source: *Primary Data* (2024)

Finding in table 6 give a full analysis of the developments that took place in SMES in the beauty products market, as suggested by some of the customers. The means are the averages of the varying responses of the participants, whereas the standard deviations show the variability of such responses. The highest mean score was 3.5871 with a standard deviation of 1.17628 rounded off to state that customers were loyal to SMEs since changing the beauty products was not easy. This implies that there is moderate degree of consensus among the customers on their loyalty issue to SMEs mainly because customers perceive

risks of switching natural beauty products. The standard deviation is rather low, and this adds credence to the notion that customer loyalty is an important contributor of SMEs in the industry. Subsequently, 3.2239 and standard deviation of 1.45073 were obtained as the mean and standard deviation of the statement SMEs have excellent relationship with customers respectively. It also means that the relationship that SMEs have towards their customers is viewed positively by them to some extent, but more varied views are expressed by the respondents, as it has a greater standard deviation. This inconsistency implies that whereas a certain proportion of customers are staunch about the quality of the relationships, other customers can have a different opinion.

The mean score of 3.2736 for "SMEs are able to provide goods and services customers need" also reflects a favorable perception, although it is slightly lower than the previous statements. The standard deviation of 1.41413 indicates that responses varied, yet still suggests that many customers recognize the ability of SMEs to meet their needs adequately.

Additionally, the statement "Customers see little advantage in switching to other beauty products" garnered a mean of 3.2687 and a standard deviation of 1.48575. This score indicates that customers perceive limited benefits associated with switching away from SMEs, although the higher standard deviation signals that opinions on this matter are quite diverse. On the other hand, the mean score of 3.2438 for "Customers value SMEs because it has efficient service" suggests a moderate level of agreement that efficiency in service is valued by customers. The standard deviation of 1.48502, similar to prior statements, points to a broad range of responses, indicating that while many customers appreciate the service efficiency of SMEs, others may have different experiences or expectations.

Finally, the lowest mean score of 3.1642 is associated with the statement "Customers of SMEs like the quality of SMEs products." This result indicates that, while customers generally have a positive perception of product quality, there is slightly less consensus compared to other factors, as reflected by the standard deviation of 1.46216.

The average mean across all statements is 3.29355 with a standard deviation of 1.412345, suggesting an overall moderate level of agreement among respondents regarding various aspects of SME growth in the beauty sector. This average indicates that while there are positive perceptions about customer loyalty, relationships, service efficiency, and product quality, the variations in responses highlight areas where SMEs may need to focus on improving customer satisfaction and addressing diverse customer experiences.

Table 7 Pearson linear coefficient correlation effect of ICT infrastructure on Growth SMES

Study Variables		**ICT infrastructure**	**Growth of SMEs**
ICT infrastructure	Pearson Correlation	1	.524*
	Sig. (2-tailed)		.000
	N	291	291
Growth of SMEs	Pearson Correlation	.524*	1
	Sig. (2-tailed)	.000	
	N	291	291
***. The correlation is monadic through the 2-tailed value at 0.05 level.**			

Source: ***Primary Data*** **(2024)**

The research used the Pearson correlation analysis to establish how ICT infrastructure correlates with SMEs growth. It was found that both the variables had significant positive correlation with Pearson correlation coefficient value of 0.524. This implies a positive correlation which implies that as the ICT infrastructure is improved, the growth of SMEs is likely to be improved also. The p-value of the correlation indicated the significance level of 0.000 which is lower than 0.05 after which it was determined that the correlation is statistically significant. In such a way, the results emphasize the role of ICT infrastructure in supporting the development of the SMEs stating the evident correlation between the two aspects.

Table 8: Linear Regression

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.524[a]	.275	.273	1.076
a. Predictors: (Constant), **ICT Infrastructure**				

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	165.462	1	165.462	142.924	.000[a]

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.524[a]	.275	.273	1.076

	Residual	436.449	290	1.158		
	Total	601.910	391			

a. Predictors: (Constant), ICT Infrastructure

b. Dependent Variable: Growth of SMEs

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.783	.137		13.055	.000
	Child Labor	.485	.041	.524	11.955	.000

a. Dependent Variable: Growth of SMEs

Source: Primary Data, 2024

In as much as the effect of ICT infrastructure on growth of SMEs is being analyzed, a simple linear regression analysis was used to establish the predictive power of ICT infrastructure on growth of SMEs. The independent variable of the model was introduced into the ICT infrastructure, and dependent variable was increase in SMEs. The findings revealed a correlation coefficient (R) of 0.524 implying that there exists a positive relationship between ICT infrastructure and the growth of SMEs. The value of R-squared 0.275 shows that ICT infrastructure can be used to explain the variance in SME growth with reference to about 27.5 percent and the adjusted R squared value 0.273 shows an estimate of about the same percentage against the number of predictors in the model.

The standard error of the estimate was found to be 1.076, indicating the average distance that the observed values fall from the regression line.

The ANOVA results further emphasized the significance of the model, with a regression sum of squares of 165.462 and a mean square of 165.462, producing an F-value of 142.924, which was statistically significant ($p < 0.001$). This finding confirms that the model significantly predicts SME growth based on ICT infrastructure. The coefficients table revealed an unstandardized constant of 1.783 with a standard error of 0.137, and the coefficient for ICT infrastructure was 0.485 with a standard error of 0.041. The standardized coefficient (Beta) for ICT infrastructure was 0.524, indicating that for each one-unit increase in ICT infrastructure, SME growth is expected to increase by approximately 0.485 units, further reinforcing the critical role of ICT infrastructure in enhancing the growth of SMEs. The significance of the coefficients was confirmed with t-values of 13.055 and 11.955, both with p-values less than 0.001, indicating statistical significance.

Interpretation

The Pearson correlation analysis revealed a significant positive correlation between ICT infrastructure and the growth of SMEs, with a Pearson correlation coefficient of 0.524 ($p < 0.000$). This suggests that as ICT infrastructure improves, the growth of SMEs is likely to increase. The linear regression analysis further supports this finding, indicating that approximately 27.5% of the variance in SME growth can be attributed to ICT infrastructure ($R^2 = 0.275$). The coefficient for ICT infrastructure was found to be 0.485, implying that for each unit increase in ICT infrastructure, SME growth is expected to increase by 0.485 units. Thus, we reject the null hypothesis that ICT infrastructure has no effect on the growth of SMEs.

Hypothesis	Correlation Coefficient	Significance (p-value)	Decision
ICT Infrastructure → Growth of SMEs	0.524	0.000	Reject null

Key Informant Interviews (KII) Responses

1. What systems have been computerized at SMEs and why?

"Small and medium-sized enterprises (SMEs) have increasingly embraced computerization across various functions, including inventory management, accounting, human resources. The primary motivation behind this shift is to enhance operational efficiency.

By utilizing accounting software, businesses can automate financial reporting and gain insights into their financial health. This technological adoption not only improves internal processes but also positions SMEs to compete effectively in increasingly digital markets".

2. Has SMEs been successful at system computerization?

"The success of system computerization in SMEs varies significantly based on several factors, including the size of the enterprise, the industry, and the level of technological investment. Many SMEs have reported positive outcomes, such as increased efficiency, reduced operational costs, and improved employee productivity. Successful implementation often hinges on proper.

"However, not all SMEs have experienced the same level of success. Some face challenges such as inadequate infrastructure, resistance to change among staff, and insufficient technical expertise. These barriers can hinder the full realization of the benefits associated with computerization, indicating that while many SMEs are on the right track, continued support and investment are essential for broader success".

Discussion

The study shows a positive relationship between ICT infrastructure and the growth of SMEs in Hargeisa. The regression analysis revealed a correlation coefficient of 0.524, suggesting that improvements in ICT infrastructure are associated with enhanced SME growth. Specifically, the model showed that for each unit increase in ICT infrastructure, SME growth is expected to increase by approximately 0.485 units.

Critical importance of a strong ICT infrastructure on SME growth is highlighted by statistical significance ($p < 0.001$) of the results.

The recent scholars accord to this and underscore the vitality of ICT infrastructure in propelling economy. To illustrate, Tambo and Akinyemi (2020) indicate that SMEs are required to adopt a robust ICT framework in order to compete in a global market successfully. Likewise, Oyelaran-Oyeyinka (2021) states that better ICT infrastructure can also help SMEs in terms of unit efficiency as well as market penetration. Also, a research study conducted by Kauffman and Walden (2022) supports the idea that the availability of SME of sound ICT infrastructure plays a crucial role in its performance.

5.2 Conclusion

The results of the study indicate a positive correlation that exists among the ICT infrastructure and the growth of the SMEs in Hargeisa, Somalia. The statistical analysis revealed that the measure of the ICT infrastructure can be positively assessed with an increase in the performance of the SME. More precisely, the regression analysis implies that the more the available ICT resources and their quality improve, the more SMEs are expected to grow, which is seen in the coefficients of correlation and the interpretability of the research conclusions. This is all the more reason why sound ICT infrastructure facilitates operations of SMEs in an effective, as well as competitive, manner.

Finally, the investment in ICT infrastructure should contribute to the creation of a favorable background to the development of the SME. As a policymaker and stakeholder in Hargeisa, promotion of ICT infrastructure needs to be leveraged as a priority since it will not only support present businesses but it will also attract new enterprises to the vicinity. The fact supported at this paper confirms the notion that sound ICT architecture is a primary inducer of entrepreneurship overwhelming and economic growth in the region.

5.3 Recommendations

The research findings suggest local authorities to invest in the improvement of ICT infrastructure of Hargeisa to stabilize the use of internet services and modern technological amenities to SMEs.

The researchers suggest that the stakeholders follow the policy of working together with the partners in the private sector to create and sustain ICT infrastructure, which acts to support the environment of SMEs.

The research suggests that the implementation of training programs that will train SMEs on how to use the available ICT infrastructure should be implemented to explore the potential of growth in SMEs as much as possible.

The study suggests that telecommunication companies with the provision of incentives ensure that their services are spread out to be able to supply all people with ICT.

The study advises the duty bearers or policymakers to develop a conducive regulatory framework that favors investments in ICT infrastructure thereby bringing more businesses in the area.

The research survey has proposed that constant evaluation of the ICT infrastructure requirements of SMEs should be conducted to take care of any future changes in trends and in accordance to the market and technological dynamics.

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