EFFICIENCY OF SMALL AND MEDIUM-SIZED ENTERPRISES IN LIBERIA: THE CASE OF MONROVIA

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Abstract

This study applies Stochastic Frontier Analysis to primary data in order to investigate the efficiency of Small and Medium-Sized Enterprises (SMEs) in Monrovia, Liberia. The study used the Two-Limit Tobit Model to identify factors that influence the efficiency of SMEs. The Tobit regression results reveal that entrepreneur experience, electricity (the proxy for infrastructure), and access to credit, positively influence the efficiency of SMEs. The policy implication for post-conflict Liberia is vital. Enhancing the efficiency of SMEs requires the government to priorities the formulation and implementation of the requisite policies to build and strengthen entrepreneurs' networks. Such policies could stimulate the diffusion of knowledge to inexperienced entrepreneurs to learn from the experience of veteran entrepreneurs. Furthermore, improving the basic infrastructure and providing broader access to credit will enhance SMEs' efficiency in order to augment their contribution to employment, economic growth and poverty reduction.

Keywords: *efficiency, stochastic frontier analysis, and Tobit Model*

1.0 Introduction

Prior to the 1960s, many studies attributed the continuous existence of small-scale enterprises in developing countries to lack of capital and entrepreneurial skills to manage large-scale businesses. However, economists began changing their perception in the mid-1960s when new approaches to Small and Medium-Sized Enterprises' (SMEs) development started to emerge due to three main factors. First, there was increasing concern over the low number of employees in large enterprises. Economists believed that policies could not make large enterprises absorb a significant portion of the rapidly increasing labour force; second, there

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was concern that the benefits of economic growth were not being equitably distributed partly due to large-scale capital-intensive enterprises; and third, empirical studies revealed that the causes of poverty were not limited to unemployment, because most of the poor were employed in a large variety of small-scale low productivity activities, (Ekpenyong & Nyong, 1992).

In recent times, there has been growing recognition that the earlier emphasis on developing countries' large-scale enterprises has had minimum success in generating employment and economic growth and alleviating poverty. For this reason, economists began to believe that providing a suitable macroeconomic environment that enhances the development of small and medium-sized enterprises is an effective way of stimulating growth and equity. For example, a number of studies have revealed that the contribution of SMEs to economic growth and GDP has substantial. It is estimated that SMEs contribute 50% of Bangladesh's industrial GDP and provide about 82% of total industrial employment. Also, in India and Pakistan SMEs contribute about 30% to GDP (Economic Survey of Pakistan 2008-09). In South Africa, SMEs account for 56% of private sector employment and 36% of GDP (Ntsika, 2002).

The development of SMEs has become crucial in most developing countries as they see them as the means of providing employment and enhancing economic growth. Many governments, especially in developing countries, have tried to implement policies to enhance the productivity and efficiency of SMEs; however, these policies have not made any significant impact on their performance or efficiency.

Following the introduction of the *Open Door Policy* in Liberia in late 1944, SMEs have continued to face competition from some foreign investors. Despite the competition, without doubt SMEs have continued to play a very important role in the economy by contributing significantly to employment creation, income generation, economic growth stimulation and poverty reduction. Despite these contributions, SMEs in Liberia continue to encounter various challenges that are faced by SMEs in almost all developing countries. These challenges include managerial incompetence, limited access to finance or credit, inadequate investment in information and communications technology, unsupportive government policy, lack of access to markets, inadequate infrastructure, corruption and crime.

The economy of Liberia is characterised by a large informal sector consisting of many SMEs. These SMEs offer the greatest potential for employment generation to complement formal sector employment. Such potential cannot be actualised if

productivity and efficiency levels in these SMEs are low and the reasons for the low level of efficiency have not been mitigated. Although SMEs seem to contribute significantly to total employment, GDP growth and poverty reduction in Liberia, their contribution remains below their actual potential because of the numerous obstacles confronting them. The inefficiency of SMEs in Liberia could undermine the fragile peace being enjoyed. This therefore evokes the need to critically investigate the efficiency of SMEs in Liberia and remedy the situation. However, in order to enhance the efficiency of SMEs, the determinants of SMEs' efficiency must be identified. To the best of my knowledge, no empirical study has been conducted on the efficiency of SMEs in Liberia, except for the study conducted on "The Macro Business Environment" by Kaliba *et al.*, (2010); hence, the need to conduct a study which would ascertain the factors that affect the efficiency of SMEs.

This article sought to investigate the efficiency of SMEs in Liberia. To do this, the study employed the Stochastic Frontier Model to examine the technical efficiency of SMEs. This article also employed the Tobit Model to identify the determinants of SMEs. The study focused on 125 SMEs making blocks and furniture and producing mineral water in Monrovia. The choice of these SMEs was motivated by the fact that each group produces homogenous products and are easily accessible.

2.0 Defining small- and medium-sized enterprises

The definition of SMEs is subjective and qualitative and so different countries define SMEs based on the obtaining level of economic development. The scale of classification tends to be smaller in developing countries, especially in Sub-Saharan Africa, because of the nature of their economies. However, the commonly used criteria are number of employees, total investment and/or sales turnover. For example in the USA, Britain and Canada, small-scale enterprises are defined in terms of their annual turnover and the number of paid employees.

In Britain, any business that makes an annual turnover of at most two million pounds and with less than 200 paid employees is considered a small-scale enterprise (Ekpenyong & Nyong, 1992). In Japan, a small-scale industry is defined according to the type of industry, the amount of paid-up capital and the number of paid employees. Hence, industries with a paid-up capital of 100 million yen (US$123,533.00) and 300 paid employees, those in the wholesale trade with 30 million yen (US$370598.99) paid-up capital and 100 employees, and those in the retail and service trades with 10 million yen (US$12353.30) paid-up capital and 50 employees are all considered SMEs (Ekpenyong *et al.*, 1992).

As regards Liberia, enterprises are classified according to the number of paid employees (part-time and/or full-time). Enterprises with 4 to 20 employees are considered small, enterprises with 21 to 50 employees are considered medium-sized, and enterprises with more than 50 employees are considered large, (MoCI, 2010). Hence, this study adopted the definition of SMEs as classified by stakeholders in Liberia for consistency in definition since the focus of the study is Liberia.

3.0 SMEs' performance and efficiency

A number of economists have placed the techniques for estimating efficiency into two categories: the parametric method and the non-parametric method. The parametric approach uses an econometric technique based on the assumption that the disturbance term constitutes two elements. The first represents the statistical noise or randomness, while the second represents technical inefficiency, which is assumed to follow a one-sided distribution (Alvarez & Crespi, 2001, 2003). The parametric approach is the Stochastic Frontier Analysis (SFA) which was introduced by Farrell (1957) in his seminar paper and subsequently developed by Aigner, Lovell and Schmidt (1977), Meeusen and van den Broeck (1977) and Battese and Corra (1977). The important feature of this model is that besides incorporating the efficiency term into the analysis (like the deterministic approaches) it also captures the effects of exogenous shocks beyond the control of the analysed units. The simplest and restricted form of the SFA is the Cobb-Douglas production frontier given as:

$$Y_i = X_i\beta + (V_i + U_i) \quad i = 1, 2, \ldots, n \qquad (4)$$

Where, Y_i is the output (or logarithm of production) of the i^{th} firm; X_i is the vector of inputs of the i^{th} firm; β is the vector to be estimated; V_i represents the random variables which are assumed to be independently and identically distributed (iid); U_i represents the random variables which are assumed to account for technical inefficiency in production and usually assumed to be iid.

The non-parametric approach uses the Data Envelopment Analysis (DEA), which is the non-statistical approach that applies a mathematical programming model to estimate the optimal output level of firms, given their inputs mix. This approach does not distinguish between technical inefficiency and statistical noise; however, it has a number of advantages. First, it does not place any restriction on the functional form of the production function. Second, it makes no *a priori* distinction between the relative importance of outputs and inputs considered relevant in a

firm's decision-making process. Third, DEA is insensitive to model specification – the efficiency measurement is similar if it is oriented to inputs or oriented to outputs, and DEA can accommodate multiple inputs and outputs simultaneously. This method also has a number of shortcomings, including its insensitivity to variable selection and data errors, and its focus on relative efficiency (efficiency of one firm with respect to others) and not absolute efficiency (the optimal amount of output that can be produced using a set of inputs). For this reason, a firm that is inefficient may be considered efficient if it does not accommodate the randomness that may affect the efficiency of firms, if DEA employs linear programming instead of the basic least squares regression analysis, and the linear programming solution of DEA produces no standard error and leaves no room for hypothesis testing. Therefore, deviation from the frontier is treated as inefficiency and no provision is made for random shock.

Kaliba *et al.*, (2010) used a one-dimensional Rash Model to quantify the macro environment of Liberia using the September 2008 to February 2009 World Bank Enterprise Survey Data. The results showed that it is very difficult to start and maintain growth in business in Liberia. The study found that corruption and infrastructure have the greatest impact on creating an unfavourable business environment. The study also found that other factors, like access to finance, theft, robbery, vandalism and arson, impact the business environment negatively. It focused on the macro business environment, leaving out other factors like owner's education and entrepreneur's age, experience and training that also affect the performance and efficiency of SMEs. This study incorporates these factors, in addition to the macro business environment, using the SFA.

Lee and Harvie (2010) evaluated the technical efficiency of manufacturing SMEs in Vietnam applying SFA to firm-level data collected from 2002 to 2007. Their study revealed that Vietnam's non-state manufacturing SMEs on aggregate have a relatively high level of technical efficiency, which averaged 89.71% for the three surveys in 2002, 2005 and 2007. The technical efficiency averages for 2002, 2005 and 2007 were 84.25%, 92.55% and 92.34%, respectively. The study also revealed that high-tech electronics and electrical equipment firms have a lower level of technical efficiency than the low-tech wood and furniture sub-sector. The coefficients for labour and intermediate inputs are significant and positive in many cases, while capital input is insignificant and negative in most cases.

Hussain *et al.* (2010) conducted a study on SMEs development through public/private partnership in Pakistan using primary data. They found that access

to credit and managerial competence significantly and positively impact the performance and growth of SMEs.

Ajibefun and Daramola (2003) investigated the efficiency of micro-enterprises in Nigeria by applying the stochastic frontier production function to cross-sectional data collected on 180 micro-enterprises selected from firms making blocks, those working with metal and those operating saw mills. The study found that the level of efficiency varies across firms. The study also found that enterprise owner's education is the most important determinant of efficiency in micro-enterprises as it was highly significant. Furthermore, age of the owner was found to affect efficiency negatively; that is, as the owner's age increases beyond a certain level, efficiency tends to decline.

Alvarez and Crespi (2001) conducted a study on the determinants of efficiency in small firms in Chilean manufacturing industries, applying the non-parametric deterministic frontier method for data collected between April and July, 1998. They found that efficiency is positively correlated with the experience of workers, the modernisation of physical capital and product innovation. They also found that outward orientation, owner's education or job experience, and participation in some public programmes do not significantly affect a firm's efficiency. They found that there was no absolute positive relationship between firm size and efficiency.

3.1 Estimation technique

To investigate the efficiency of SMEs, this study adopted the SFA[12] introduced by Farrell in his seminar paper in 1957 and used by a number of authors, including Lee and Harvie (2010), Ajibefun and Daramola (2003), and Pitt and Lee (1980), to estimate the efficiency of firms.

The SFA was preferred to other techniques for measuring efficiency because it considers factors beyond the control of the firm and firm-specific factors, and hence it is closer to reality. Second, the error term captures the effects of exogenous shocks or random variations of the frontier across firms and the effects of measurement error, and third it incorporates technical inefficiency.

[12] The Stochastic Frontier Analysis is also called the Stochastic Frontier Production Function

This study used the Cobb-Douglas Production Frontier, which is a simplified and restricted form of the Translog Stochastic Frontier Analysis. The Cobb-Douglas Production Frontier is denoted by:

$$Y_i = X_i\beta + (V_i + U_i) \quad i = 1, 2, \ldots, n \tag{6}$$

Where, Y_i is the output (or logarithm of production) of the i[th] firm; X_i is the vector of inputs of the i[th] firm; β is the vector to be estimated; V_i represents the random variables which are assumed to be independently and identically distributed (iid); U_i represents the random variables which are assumed to account for technical inefficiency in production and usually assumed to be independently and identically distributed. The Translog Stochastic Production Function used in this study is expressed as:

$$\begin{aligned} \ln Y_i &= \beta_0 + \beta_1 L_i + \beta_2 K_i + \beta_3 ME_i \\ &+ \beta_4 (\ln L_i)^2 + \beta_5 (\ln K_i)^2 + \beta_6 (\ln ME_i)^2 \\ &+ \beta_7 \ln L_i \ln K_i + \beta_8 \ln L_i \ln ME_i + \ln K_i \ln ME_i + V_i + U_i \end{aligned} \tag{7}$$

Where: Y_i is the output of firm i; L_i is labour input of firm i; K_i is capital investment of firm i; ME_i is the material input and energy costs of firm i. The equation on the second line represents the square terms of the factor inputs, the equation on the third line represents the interactive terms of the factor inputs, including V_i, which is the random error assumed to be $N(\mu_i, \sigma^2{}_v)$, and U_i which represents the technical inefficiency and is assumed to be $N(\mu_i, \sigma^2 u)$. The β's are coefficients.

3.2 Identification of factors that affect efficiency

To identify the factors that affect the efficiency of SMEs this study applied the Tobit Model developed by James Tobin and used by a number of authors to ascertain the factors that affect the productivity and/or efficiency of commercial banks and other firms. Some of these authors include Aikaeli (2008) and Sammy (2008). This model is appropriate because of its advantages in estimating equations whose dependent variable values are restricted within a specific range (Gujarati, 2003). The original Tobit Model is specified in terms of an indexed function denoted as

$$y_i^* = x'\delta + \varepsilon_i \tag{8}$$

$y_i = 0$, if $y_i^* \leq 0$ and

$y_i = 0$, if $y_i^* > 0$,

Where y_i is the transformed random variable, y^* is a column vector of independent variables which is a transpose of 1xK row of x, δ is a vector of parameters to be estimated and ε_i represents a column vector of disturbances. In the case of lower and upper truncations, this model was adjusted in line with Maddala (1983). The two-limit specification of the doubly-truncated Tobit model used in this study is given below.

$$y_i = x_i'\delta + \varepsilon_i \quad (9)$$

$$y_i^* = L_{1i} \text{ if } y_i^* \leq L_{1i}$$

$$= y_i \text{ if } L_{1i} < y_i < L_{2i}$$

$$= L_{2i} \text{ if } y_i \leq L_{2i}$$

Where y is the latent or unobserved variable and y^* is the observed dependent variable. L_{1i} is the lower limit and L_{21} is the upper limit.

The model specified to estimate factors that determine efficiency is given as

$$Eff = f(L, K, M, AE, AE^2, AC, Exp, AF, I, E, C, MA)$$

Where Eff represents the efficiency index estimated from the Translog stochastic frontier production function, L represents labour and K represents capital. M denotes managerial competence, which encompasses education level, training and experience of entrepreneur. AE denotes age of entrepreneur, AE^2 represents the age of entrepreneur squared, AC denotes access to credit, and Exp denotes experience of entrepreneur. I denotes infrastructure while AF denotes age of firm. E represents electricity, C represents communication and MA represents access to markets.

Therefore the Tobit Model efficiency function is expressed econometrically as

$$(eff)_i = \alpha_o + \alpha_1 L + \alpha_2 K + \alpha_3 M + \alpha_4 \pi + \alpha_5 AE + \alpha_6 AC + \alpha_7 Exp + \alpha_8 AF + \alpha_9 I + \alpha_{10} M + \alpha_{11} C + \alpha_{12} MA + AE^2 + \varepsilon_i$$

if LHS > 0

$(Eff)_i = 0$, otherwise (10)

The efficiency index was calculated for all firms. The efficiency index lies between zero and one; a value of one indicates that the firm is efficient whereas a value of zero indicates that the firm is inefficient. A firm with an efficiency index of less than 1 (say 0.9) is inefficient; however such a firm is more efficient than a firm with an efficiency index of any value less than 0.9.

3.3 Data source

This study used primary data collected from 125 small and medium-size enterprises making concrete blocks and furniture and producing mineral water based on a set of questionnaires. There were 47 SMEs making concrete blocks, 66 making furniture and 12 producing mineral water. The survey used the multi-stage stratified random sampling technique to select SMEs that were interviewed to ensure that they represented various parts of Monrovia. The advantage of this sampling technique is that it does not require a sampling frame and was most appropriate for this study because the majority of SMEs in Liberia (especially small enterprises which are in large number) operate in the informal sector; hence, there is no official document or listing that could be referenced as a sampling frame for conducting the survey.

Monrovia is divided into six zones: Central Monrovia, Sinkor (including Fiamah and Air Field), Congo Town (including Old Road), Paynesville, Gardnerville, and Bushrod Island. Fifteen percent of the SMEs producing concrete blocks and furniture were sampled from each zone using the random sampling technique in order to minimise sampling bias, while all the mineral water-producing firms were included because there are very few of them in Monrovia. However, out of the 125 SMEs sampled, there were only 100 valid questionnaires, 43 from SMEs producing concrete blocks, 50 from those producing furniture and 7 producing mineral water. Out of the 25 invalid questionnaires, 4 entrepreneurs refused to participate in the interview, 9 entrepreneurs gave incomplete responses and 12 gave inconsistent responses.

Table 1: Variables - measurement and a priori expectation

Variable	Measurement[13]	*A priori* Expectation[14]
Labour	Average monthly wages	Negative
Material input	Average monthly material input cost	Negative
Capital	Proxied by initial investment	Negative
Managerial competence	Educational level of entrepreneur	Negative
	Training of entrepreneur	Negative
	Experience of entrepreneur	Negative
Age of entrepreneur	Number of years	Negative
Age of entrepreneur squared	Number of years squared	Positive
Age of firm	Years of operation	Negative
Infrastructure	Electricity	Negative
	Communication	Negative
Access to credit	Dummy taking 1 where credit is available and "0" otherwise	Negative
Access to markets	Dummy taking 1 where firm has customers and "0" otherwise	Negative
Level of investment	Initial investment	Negative

In order to measure efficiency (technical), the study used the natural log of average monthly output, which measured in monetary value (United States dollars) the average monthly output produced as the dependent variable; while the independent variables include average cost of labour, average cost of material inputs (including energy)[15] and capital.

[13] All variables that have to do with cost are measured in US dollars

[14] *A priori* expectations are given in relation to inefficiency

[15] Information on wages and salaries, cost of material inputs, output and sales were collected for the preceding five months before the survey, and the average for each variable was computed.

4.0 Empirical results and implications

The estimates of the Stochastic Frontier Model reveal that SMEs are technically efficient. The functional form of the model was selected based on the likely log results of the two most common functional forms of the Stochastic Frontier Model[16]. To ensure that correlated independent variables were not included in the same model, the study tested for correlation among the independent variables. The results reveal that the variables are not correlated. Following this, the study estimated the Stochastic Frontier Model.

Table 2: Stochastic Frontier Model estimates of technical efficiency

Stoc. Frontier normal/half-normal model Number of obs. = 100
Wald chi2(9) = 448.58
Log likelihood = -31.60283 Prob.> chi2 = 0.0000

Log of value of average output	Coefficient	Standard Error	Z	P>|z|	[95% Conf.	Interval]
Log of average wages & salaries	1.851985	.5835854	3.17	0.002	.7081783	2.995791
Log of average material input cost	-1.096257	.7020493	-1.56	0.118	-2.472249	.2797339
Log of initial investment	.8609949	.7573887	1.14	0.256	-.6234597	2.345449
Log of average wages & salaries squared	-.01152	.0683077	-0.17	0.866	-.1454007	.1223606

[16] These functional forms are the Cobb-Douglas production function and the Transcendental-logarithm (Translog) Production Function. The results revealed that the Translog specification is most appropriate for this study because it had the lower log likelihood in terms of absolute value.

Log of average material input cost squared	.2024522	.0510583	3.97	0.000	.1023799	.3025246
Log of initial investment squared	.3766783	.2583585	1.46	0.145	-.129695	.8830516
Log of average wages & salaries*log of average material input cost	-.2012	.1013335	-1.99	0.047	-.39981	-.0025899
Log of average wages & salaries*log of initial investment	.037929	.1377013	0.28	0.783	-.2319607	.3078187
Log of average material input cost*log of initial investment	-.1888206	.1045607	-1.81	0.071	-.3937558	.0161146
_constant	3.597495	2.985705	1.20	0.228	-2.254379	9.449369
/lnsig2v	-2.608954	.3252095	-8.02	0.000	-3.246353	-1.971555
/lnsig2u	-2.269309	.6536262	-3.47	0.001	-3.550393	-.9882254
sigma_v	.2713144	.044117			.1972711	.373149
sigma_u	.3215332	.1050812			.1694502	.610112
sigma2	.1769951	.0511096			.0768222	.277168
Lambda	1.185094	.1422346			.9063197	1.463869

Likelihood-ratio test of sigma_u=0: chibar2 (01) = 1.56
Prob>=chibar2 = 0.106

Sigma squared of 0.2 indicates that SMEs in Monrovia are technically inefficient; hence, the null hypothesis is not rejected. Both sigma squared 'u' and sigma squared 'v' are significant at 1%. Sigma 'u' of 0.3519233 indicates that 35% of the variation from the production frontier is caused by technical inefficiency.

In order to identify the determinants of efficiency using the Tobit Model, the study conducted a post-estimation of the Stochastic Frontier estimates to obtain the inefficiency scores, which were then used as the dependent variable in the Tobit Model. See Table A.1 in the Appendix for the inefficiency scores. Table 2 reveals the summary statistics of the inefficiency scores. The summary shows that the inefficiency of SMEs in Monrovia ranges from 0.07 or 7% to 0.62 or 62%, while the average inefficiency is 0.21 or 21%. This implies that the average efficiency of SMEs in Monrovia is 79%. This leads to the identification of factors that affect the efficiency of SMEs since the Stochastic Frontier estimation confirmed that SMEs in Monrovia are technically inefficient and inefficiency scores have been obtained.

Table 3: Summary statistics of inefficiency scores

Variable	Mean	Std. Deviation
Inefficiency scores	.2109783	.0813162

Source: Author's computation from 2011 Efficiency of SMEs in Monrovia survey data

Inefficiency scores were regressed against the twelve explanatory variables of average monthly wages and salaries, average monthly material input cost, initial investment and education of entrepreneur, experience of entrepreneur, training of entrepreneur, electricity and communication as proxies for infrastructure, access to markets, access to credit, age of entrepreneur, age of entrepreneur squared and age of firm. The study also tested for correlation between the independent variables, and the results reveal that average monthly material input cost was correlated with average monthly wages and salaries; hence, average monthly material input cost was dropped from the model. Age of entrepreneur was also found to be correlated with age squared of entrepreneur, which is obvious.

Table 4: Tobit Model estimates of the determinants of inefficiency

Inefficiency Scores	Coefficient	Std. Err	t	P>|t|	[95% Conf.	Interval]
Age of entrepreneur	-.0100238	.0565512	-0.18	0.860	-. 1224075	.1023599
Age of entrepreneur squared	.002056	.0082084	0.25	0.803	-.0142564	.0183685
Age of firm	-.0022703	.0025302	-0.90	0.372	-.0072985	.0027579
verage wages & salaries	.0000409	.0000297	1.38	0.171	-.000018	.0000999
Initial investment	.0006959	.0072883	0.10	0.924	-.013788	.0151798

Education level of entrepreneur	-.0038435	.0095055	-0.40	0.687	-.0227337	.0150467
Experience of Entrepreneur	-.0354447	.011453	-3.09	0.003	-.0582051	-.0126844
Training of entrepreneur	-.0078653	.0164815	-0.48	0.634	-.0406189	.0248882
Electricity	-.0308203	.0158799	-1.94	0.055	-.0623783	.0007377
Communication	-.0369181	.0304466	-1.21	0.229	-.0974243	.0235881
Market Availability	-.0181441	.0242347	-0.75	0.456	-.0663055	.0300172
Access to credit	-.0409719	.0153758	-2.66	0.009	-.071528	-.0104159
_Constant	.3935074	.1085502	3.63	0.000	.1777868	.6092281
/Sigma	.0716748	.0051586			.0614232	.0819264

Obs. summary: 1 left-censored observation at inefficiency <=.07245255
98 uncensored observations
1 right-censored observation at inefficiency>=.62291145

a) Experience of entrepreneur

Table 4 reveals that experience of entrepreneur is significant at 1% with a negative coefficient. As indicated earlier, experience of entrepreneur is defined in terms of the knowledge that an entrepreneur acquires while operating that form of business over a period of time. The implication of the result is that as the entrepreneur acquires experience, the level of inefficiency in the firm decreases. Entrepreneurs with many years of experience understand production and market dynamics and hence know what types of strategies to introduce to minimise any effects that may result from changes in the microeconomic or macroeconomic variables. Therefore, they are able to increase output or productivity using the same quantity of inputs (output efficiency), as well as increase the demand for their products (market efficiency). This result conforms to the entrepreneur learning theory that SMEs' strategic development and change results from the combination of knowledge and experience rather than from plan development (Deakins & Freel, 1998). In order for the efficiency of SMEs to be enhanced, the need for inexperienced entrepreneurs to learn from knowledgeable entrepreneurs is imperative. This can be achieved through networking and conducting periodic workshops for inexperienced entrepreneurs.

b) Infrastructure

The proxy for infrastructure, electricity, is significant at 10% and has a negative coefficient. This implies that improvement in the supply of electricity reduces the inefficiency of SMEs and deterioration in the supply of electricity increases inefficiency. The availability of a stable power supply enhances the efficiency of

SMEs and at the same time reduces production costs. The implication is that as firms' efficiency increases, productivity increases and demand for their products rises, thereby increasing incomes and reducing poverty. Inadequate infrastructure is found to be one of the sources of inefficiency in firms. In order for the private sector to serve as an engine of broad-based shared and sustainable economic growth, as enshrined in the Poverty Reduction Strategy of Liberia (2008), the need to improve infrastructure, especially the electricity supply, should be at the top of the government's development agenda.

c) Access to credit

Access to credit is also significant at 1% and has a negative coefficient. The implication is that as access to credit increases, inefficiency in SMEs decreases. As indicated previously, access to credit is the availability of credit, whereby entrepreneurs can request a loan if they wish to expand or enhance their production. This implies that the availability of credit enables entrepreneurs to acquire the requisite inputs for production. Furthermore, the availability of capital reduces the cost of acquiring capital and so the difference can be used to produce additional output. The efficiency of SMEs results in increased productivity, greater market demand and higher incomes. Access to credit is critical for increasing the efficiency of SMEs in order to make them competitive, especially in a country like Liberia that is import-oriented, which is why the government, in its MSME Development Policy, underscores the need for quality and sustainable microfinance services to be made increasingly available to Liberian SMEs, and for these entrepreneurs to be educated in the procedures for acquiring loans from banks and other microfinance institutions.

5.0 Conclusion and policy implication

The research found out that SMEs in Monrovia are technically inefficient. For a post-conflict developing economy like Liberia, the inefficiency of firms is a natural phenomenon. Only 11% of SMEs have an inefficiency level of less than 30%, while 89% are operating at an inefficiency level from a minimum of 30% to a maximum of 70%. The estimates of the Tobit Model reveal that entrepreneur's experience, infrastructure and access to credit are factors that influence the efficiency of SMEs in Monrovia and so they are critical to the sustainable economic development and growth of SMEs.

This study argues that the knowledge, skills and experience of entrepreneurs significantly impacts the efficiency of firms, contrary to the findings of Alvarez and

Crespi (2001), because the efficiency of any firm depends to a large extent on the combination of inputs in the production of goods and services and on identifying markets for products. Decisions regarding these matters are often difficult to make given the dynamic pattern of economies, especially in Sub-Sahara Africa, where inflation is on the increase, exchange rates are depreciating, and there is a shortage of intermediate inputs and high unemployment. It takes experienced entrepreneurs to make the requisite decisions that will enhance firms' efficiency in the face of the uncertain macroeconomic environment.

In the light of the economic infrastructure, it is evident that improved energy infrastructure is critical to the enhancement of firms' efficiency and their competitiveness. Studies show that firms in countries with improved infrastructure are often more efficient and competitive than those operating in countries with inadequate infrastructure. Investment in physical infrastructure such as electricity, telecommunications, water supply, transportation and storage enhances production and reduces its costs. For example, firms in China, India, Singapore and Brazil are more efficient than firms in Sub-Sahara African countries because of the difference in the level of infrastructure investment. Also, the economy of China has achieved impressive growth during the last few decades because of its investment in infrastructure. If Sub-Sahara African countries, especially Liberia, are to achieve private sector-driven economic growth, the infrastructure must be improved in order to facilitate the production of firms.

Access to credit is a crucial determinant of the efficiency of firms. The majority of SMEs in Sub-Sahara African countries often do not grow and compete with other firms because they do not have adequate financial capital to improve their production techniques so as to improve the quality of their products or increase productivity. Where financial credit is available, the cost of borrowing is often too high or the bureaucracy involved in acquiring a loan is cumbersome. For this reason, the growth of SMEs in Sub-Sahara Africa, in particular Liberia, is often inhibited because entrepreneurs are unable to acquire capital to purchase the requisite inputs to enhance their productivity. Broader access to capital will reduce the cost of capital and hence enable entrepreneurs to acquire loans to purchase the necessary inputs to improve their production techniques and increase productivity.

Government policy is vital for creating a suitable environment that enhances firms' efficiency. For example, a high tax rate on businesses would increase their production costs and hinder their profitability. On the other hand, a favourable tax rate and government spending to improve public services like roads, power and water supply, telecommunications and storage could enhance firms' efficiency by

reducing their production costs, thereby increasing productivity. Furthermore, government policy in relation to providing a market for firms' outputs will greatly improve their efficiency.

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Appendix

Table A.3.1: Inefficiency scores in ascending order

Inefficiency scores	Inefficiency scores*100	Frequency	Percent	Cumulative
.0724525	7.25	1	1	1
.0897108	8.97	1	1	2
.0926564	9.27	1	1	3
.0999893	10.00	1	1	4
.1089005	10.89	1	1	5
.1125746	11.26	1	1	6
.1176186	11.76	1	1	7
.1182195	11.82	1	1	8
.1214197	12.14	1	1	9
.1218007	12.18	1	1	10
.122838	12.28	1	1	11
.1235576	12.36	1	1	12
.1269219	12.69	1	1	13
.1279635	12.80	1	1	14
.130241	13.02	1	1	15
.1322894	13.23	1	1	16
.1377333	13.77	1	1	17
.1383814	13.84	1	1	18
.1433901	14.34	1	1	19
.1473677	14.74	1	1	20
.1478516	14.79	1	1	21
.1489583	14.90	1	1	22
.1499923	15.00	1	1	23
.1503506	15.04	1	1	24
.1535811	15.36	1	1	25
.1549547	15.50	1	1	26
.1577237	15.77	1	1	27
.1588614	15.89	1	1	28
.1627955	16.28	1	1	29
.1653685	16.54	1	1	30
.1657127	16.57	1	1	31
.1681737	16.82	1	1	32
.1712569	17.13	1	1	33
.1727544	17.28	1	1	34

.1743109	17.43	1	1	35
.175808	17.58	1	1	36
.1760607	17.61	1	1	37
.1767119	17.67	1	1	38
.1785942	17.86	1	1	39
.180244	18.02	1	1	40
.182554	18.26	1	1	41
.1829987	18.30	1	1	42
.1849322	18.49	1	1	43
.1851022	18.51	1	1	44
.1860141	18.60	1	1	45
.1890453	18.90	1	1	46
.1904286	19.04	1	1	47
.1918193	19.18	1	1	48
.1952184	19.52	1	1	49
.1953661	19.54	1	1	50
.1986949	19.87	1	1	51
.2055489	20.55	1	1	52
.2083699	20.84	1	1	53
.2089803	20.90	1	1	54
.2102234	21.02	1	1	55
.2166639	21.67	1	1	56
.2170452	21.70	1	1	57
.2173125	21.73	1	1	58
.2178639	21.79	1	1	59
.2195984	21.96	1	1	60
.2203034	22.02	1	1	61
.2204519	22.05	1	1	62
.2207429	22.07	1	1	63
.2217876	22.18	1	1	64
.2245203	22.45	1	1	65
.2284763	22.85	1	1	66
.2329289	23.29	1	1	67
.2365336	23.65	1	1	68
.239472	23.95	1	1	69
.2402952	24.03	1	1	70
.2403062	24.03	1	1	71
.2445907	24.46	1	1	72
.2475893	24.76	1	1	73

.2507375	25.07	1	1	74
.2510984	25.11	1	1	75
.2559776	25.60	1	1	76
.2569242	25.69	1	1	77
.2614679	26.15	1	1	78
.2634723	26.35	1	1	79
.2668506	26.69	1	1	80
.2686971	26.87	1	1	81
.2691686	26.92	1	1	82
.2792204	27.92	1	1	83
.2801964	28.02	1	1	84
.2828335	28.28	1	1	85
.2864326	28.64	1	1	86
.2895902	28.96	1	1	87
.2927864	29.28	1	1	88
.294282	29.42	1	1	89
.3004126	30.04	1	1	90
.3013185	30.13	1	1	91
.3099123	30.99	1	1	92
.3167429	31.67	1	1	93
.3229675	32.30	1	1	94
.3314752	33.15	1	1	95
.3468171	34.68	1	1	96
.3880715	38.81	1	1	97
.4039231	40.39	1	1	98
.4056702	40.57	1	1	99
.6229115	62.29	1	1	100
Total		**100**	**100**	

Source: Author's computation from 2011 Efficiency of SMEs in Monrovia survey data

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Abstract

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1.0 Introduction

The cultural heritage of a
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