Performance of Micro and Small-Scale Enterprises: The case of Adama, Oromia

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Micro and small-scale enterprises play a vital role in the Ethiopian economy. But there is evidence that the sector is less efficient as compared to large enterprises in the country. Hence it is more logical to examine performance of MSEs through measuring their efficiency levels and factors contribute to inefficiency. Therefore, this study was assessed the technical efficiency and input slacks of MSEs in Adama, Oromia Region, using the Data Envelopment Analysis Function (DEA) specifically by focusing on three groups of businesses (block making, metalwork, and woodwork). The result revealed that high levels of technical inefficiency and high level of input wastage. The study also identified the critical problems faced by enterprises. Accordingly; it is observed that, market linkage, corruption, market place, and manufacturing place are the dominant one. Therefore, as policy recommendation, continuous monitoring and evaluation with policies that should reduce gender gap is very important. In addition, a lot of things needs to done to reduce the amount of input wasted and the level of inefficiency; this includes improving the capacity of participants (short and long-term training), use advanced technology and experience sharing.

Key words: Micro and small-scale enterprises, DEA, Technical efficiency, Input slacks, Performance.

INTRODUCTION

The Small and Medium Scale Enterprises (MSEs) are believed to be the engine part for the development and growth of any economy in the world. The development of this sector is mainly important to bring about economic growth through its obvious forward and backward linkage, which in turn enhances the growth of other sectors in the economy. Currently the number of Ethiopian population is increasing from time to time in increasing rates. Without the proportionate growth in productivity the poor getting poorer and poorer whereas, the rich getting richer and richer. In the other words the gap between poor and rich are become wider and wider.

The emergences of MSEs have highly contributed to the local economic development and countries over all growth in the general in terms of, employment creation, Productivity, and other effects (Levitsky, 1989). As a result of this, government bodies at different levels have long recognized the need to promote the development of SMEs in order to reduce the level of poverty, alleviation of unemployment, and reduce income inequality. Specially, the target of the sector is mainly on the poor that have exposed to poverty.

In addition to this, the existence of extreme vulnerable makes those families who are not currently poor have the risk of falling into extreme poverty, and impossible for to accumulate assets that break out poverty. But there is evidence that this sector is less efficient as compared to large enterprise. According to Nigist (1998) report, the sector absorbs a greater number of labor forces that do not have high level of training, without much capital and large technology. The research conduct by Endalkachew also identified number of constraints hampering the development of this sector and unfavorable legal and regulatory frameworks, underdeveloped infrastructure, poor business development service, limited access to finance, ineffective and poorly coordinated institutional support as the key drawbacks (Endalkachew, 2008). Therefore, promotion and capacitating of such enterprises in country like Ethiopia is of huge advantage since it brings about a fair distribution of
income and accumulation of wealth, economic self-dependence, entrepreneurial concept development and a host of other positive, economic uplifting factors. The Adama has undertaken SMEs program by organizing the youth into group to create job opportunity. Currently, there is a research gap in examining the efficiency level and factors contribute to inefficiency. Hence, it is more logical to examine growth and potential of SMEs through measuring their efficiency levels and factors contribute to inefficiency.

METHODOLOGY

Description of the study area

Adama is a transit railway city located in the Eastern Shoa Zone of Oromia Region, linking Addis Ababa to Djibouti. It located at the distance of 99 kilometers to the Southeast along the main road to Harar from Addis Ababa, which is the capital city of Ethiopia. Its grid references point that the city stretches between 8° 33’ to 8° 36’ North latitude and 39° 11’ 57” to 39° 21’ 15” East longitude (citation). According to CSA (2007) the total population of the district is estimated 155,321 out of which 78997 (50.86%) are male and 76324 (49.14%) are female. Most of the population 129003 (83.06%) are living in urban areas while the remaining 26318 (16.94%) are living in rural areas (citation). Topographically, Adama and its surrounding are associated with diversified land forms consisting of fault scraps and fault-controlled depressions covered with sediments and volcanic domes and cones. The area it enjoys hot and sunny climate in summer. The annual temperature is falling between 19°C and 22°C as minimum and maximum, respectively. Its yearly minimum rainfall has reported to be 760 mm while the maximum reach 1150mm.

Data type and sources

Both time series and cross-sectional data was collected from primary as well as secondary sources. Primary data was collected directly from individual micro and small-scale enterprises. Secondary data was gathered from relevant information sources from different institutions dealing with MSEs like CSA, Adama MSEs office, and Adama Agriculture office.

Sampling procedures

Qualitative and quantitative method was used in combination. Sampling was stratified, purposive and random in consultation with Adama MSEs expertise. These expertises help the researcher to formulate representative sample sizes by giving details about MSEs. Accordingly, a sample of 45 enterprises is selected out of the total 268 respondents. First, MSEs are stratified into group of Block making, Metalwork and wood work based the type of businesses. Then, 45 enterprises were drawn randomly from stratified groups.

Data collection

A primary source of data was collected through structured interview schedule and discussion with key informant. The primary data was supported by secondary data from different governmental organization. Observations were also used to provide further information where it’s appropriate.

Data analysis

Both Data Envelopment Analysis (DEA) and simple descriptive statistics such as percentage, tables and figures are used to analyze the collected data and also additionally, qualitative analysis was conducted. There are two set of techniques, namely production frontier and data envelopment analysis. Compared to stochastic frontier analysis, the major advantage of DEA approach is that it uses a linear programming model to estimate the best-practice frontier without a specific functional form assumption. It assumes constant returns to scale. What’s more, it is particularly suitable for analyzing multiple inputs and multiple outputs (Charnes et al., 1985; Zhu, 2000).

There are a number of equivalent formulations for DEA. The most direct formulation of the is as follows:

\[
\begin{align*}
\text{Min} & \quad \theta \\
\text{s.t.} & \quad \sum \lambda_i X_i \leq \theta X_c \\
& \quad \sum \lambda_i Y_i \geq Y_c \\
& \quad \lambda > 0
\end{align*}
\]

Let \( X_i \) be the vector of inputs into DMU i. Let \( Y_i \) be the corresponding vector of outputs. Let \( X_c \) be the inputs into a DMU for which we want to determine its efficiency and \( Y_c \) be the outputs. So, the \( X_i 's \) and the \( Y_i 's \) are the data. The measure of efficiency for DMUc is given by the following linear program: where \( \lambda_i \) is the weight given to \( X_i \). If, in optimality, \( \theta \) is equal to 1 and all input and output slack variables are equal to zero, then decision making unit is CRS-efficient and is operating on the CRS frontier. Otherwise, if \( \theta \) is not equal to 1, and/or some input/output slacks are non-zero, then the decision making unit is CRS-inefficient, which implies that some latent resources are still not being fully utilized.

RESULTS AND DISCUSSIONS

Demographic characteristics of operators

The survey result showed that, the majority of the sampled households are dominated by male participants. Out of the total sampled household heads interviewed during survey 98% managers’ positions were occupied by male households and remaining 2% was the fate for females. Regarding, the work experience in relation to respective business type, about 25.34%, 42.08%, 10.87%, and 21.7% are holds for skilled male, unskilled male, skilled female and unskilled female, respectively. The descriptive statistics
result also showed that 64.6% of the respondents are found to be between grade 9 and 12; where as 24.4% of the sample household were falls in between grade 1 and 8. As Hall (1995), suggested the productivity of small business firms have positively influenced by the level of education. This study also forward same recommendation for policy makers and organizations that deals with micro and small enterprises.

Technical efficiency level

Technical efficiency level and input slacks for Block-making enterprises

The efficiency for block-making enterprises used main inputs such as cement, sand, electricity, water, and labor with the corresponding outputs over the sample period. Accordingly, the result from DEA indicated that most of block making enterprises do not have room to improve their efficiency level given current technology. The blind expansion of input will lead to a waste of resource. Growth of efficiency level was inconsistent but efficient at the end of the sample period. Figure 1 pointed out that, the levels of technical efficiency are quite different over the sampled operation period. Hence, enterprises have unstable technical efficiencies across enterprises and across their operation scale.

Figure 1: Efficiency score of Block-making Enterprises

Table 1. Efficiency score for Block making enterprises

<table>
<thead>
<tr>
<th>Years</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>93.34%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>99.79%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>100.00%</td>
<td>97.74%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>98.21%</td>
<td>93.80%</td>
<td>99.31%</td>
<td>96.97%</td>
<td>97.96%</td>
<td></td>
</tr>
<tr>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>96.15%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>73.97%</td>
<td>71.58%</td>
<td>91.35%</td>
<td>76.36%</td>
<td>77.46%</td>
<td></td>
</tr>
<tr>
<td>74.39%</td>
<td>75.87%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

Block making enterprises operate on the best practice frontier and significant differences exist between different types of enterprises in terms of efficiency score (Table 1). The difference in technical efficiency score is holds true for same enterprises at different periods of production. The maximum and minimum efficiency holds 100% and 71.58% over the five years of production.

Input slack for Block Making Enterprises

Figure 2 presents the results of DEA input slacks for block making enterprises. A first look at the block making enterprises data distribution a number of surprising wastage evidences. From input used by these enterprises, presented in figure 2, is severely skewed towards labor wastage as compared to other resources. This is simply because of the fact that this type of business is demanding large number of labors so that enterprises have the probability to expose to labor misutilization.

Figure 2. Input slacks for Block making enterprises

Relationships between input slacks and the level technical efficiency score over five years in the case of block making enterprises

By definition, an input slack indicates that the amount of inputs wasted by enterprises unnecessarily. On the other hand, efficiency evaluates how the producing units are combining their inputs proportionally to produce at the maximum attainable level of production.

Figure 3. Relationship between input slack and efficiency score for block making enterprises

As can be seen from figure 3, the input slack was constant between 2007-2011. However, the technical efficiency of the enterprises varies across different years. From this, it is possible to conclude that input slack may not indicate all the detail for the inefficiency of the enterprises rather it tells about wasted resource over that production periods. In the other word, input slack does not provide all the detail for the question why enterprises are inefficient.

Technical efficiency level and input slacks for metal work enterprises

Technical efficiency level for metal work enterprises

Through the use of five years data (2007-2011) concerning input (metal, electricity, labor) and output of metal work enterprises and feed it into DEA model, the
efficiency score is obtained, the specific results are shown in the following figure 4.

![Figure 4. Technical efficiency score of metal work enterprises over five years](image)

Based on the principle DEA of judging whether the enterprise is efficient or inefficient, the study summarizes that there are significant variations in the level of technical efficiency across enterprises in different periods. Between 2007 and 2008 most the sampled enterprises were inefficient and all became efficient in late 2011.

**Table 2. Efficiency score for metal work enterprises in detail**

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>14.07%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
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<tr>
<td>100.00%</td>
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<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
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</tr>
<tr>
<td>9.67%</td>
<td>91.08%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td>23.33%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td>14.07%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td>14.07%</td>
<td>81.44%</td>
<td>77.40%</td>
<td>40.27%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

For the metal work enterprises, the minimum efficiency level is 14.07% scored in 2007 while 100% efficiency obtained in 2011 as shown in table 2. Also from table 2 it’s possible to conclude that, like block making enterprise there are no room for improvement in the level of efficiency score for metal work enterprises given the current technology at hand.

**Input slacks of metalwork enterprises**

![Figure 5. Input slacks for Metalwork enterprises](image)

Labor input has utilized unnecessarily as indicated in figure 5 and compared to other resources used in production. Similarly, figure 5, illustrates that wasted labor at different production year. Correspondingly, some of the enterprises were wasted more labor resources in between 2007 and 2008 but their input slack became zero from the mid of 2008 to 2011.

**Relationships between input slacks and the level technical efficiency score over five years in the case of Metal work enterprises**

![Figure 6: Relationships between input slacks and level of efficiency score for metalwork enterprises](image)

The result in Figure 6, shows that for metal work enterprises the input slack was highest in 2007 and declined to zero in 2011 like block making enterprises, the level of technical efficiency score varies across different years. This shows that even if the amounts of wasted inputs are zero, the level of technical efficiency score is not necessarily become 100%. There are many other factors which derive enterprises to the level of inefficiency addition to input slacks.

**Technical efficiency level and input slacks for wood work enterprises**

**Technical efficiency level for wood work enterprises**

![Figure 7. Technical efficiency score for wood work enterprises between 2007-2011](image)

Figure 7, illustrates technical efficiency score of woodwork enterprises in which most of them were inefficient in at different production period. To sum up, the data analysis result from woodwork enterprises indicated that most of enterprises were inefficient and therefore, the study suggests that wood work enterprises need to optimally utilize their current technology. As DEA result showed wood work enterprises are the most inefficient as compared to metal work and block making enterprises.
Table 3. Efficiency score for wood work enterprises

<table>
<thead>
<tr>
<th>Efficiency score for wood work enterprises by Years</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.92%</td>
<td>36.84%</td>
<td>31.96%</td>
<td>40.24%</td>
<td>93.63%</td>
<td></td>
</tr>
<tr>
<td>100.00%</td>
<td>85.63%</td>
<td>66.72%</td>
<td>97.20%</td>
<td>98.44%</td>
<td></td>
</tr>
<tr>
<td>63.77%</td>
<td>36.31%</td>
<td>43.71%</td>
<td>36.46%</td>
<td>91.95%</td>
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<td>100.00%</td>
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</tr>
<tr>
<td>88.64%</td>
<td>49.58%</td>
<td>52.51%</td>
<td>92.85%</td>
<td>99.24%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the above result of table 3, a large number of enterprises are ineffective due to many reason like scale inefficiency.

**Input slacks of wood work enterprises**

In order to depict the input slacks of each enterprise over five years its distribution was presented in a more colorful manner in Figure 8

![Figure 8: Input slacks for wood work enterprises](image)

The distribution in Figure 8 clear pointed out that labor is the most wasted resource inefficiently utilized by woodwork enterprises until 2011. Therefore, in all sampled enterprises labor is the most wasted and unnecessarily utilized input resource as compared to others.

**Relationships between input slacks and the level technical efficiency score over five years in the case of wood work making enterprises**

Like the former two businesses, the reduction or increment of technical efficiency have not necessarily associated with the reduction or increment of the input slack (figure 9)

![Figure 9. Relationship between input slacks and efficiency score for wood work enterprises](image)

**CONCLUSION AND RECOMMENDATIONS**

From the findings of this study it has been conclude, the participation of women in MSEs in Adama district are limited in number as compared to the percentage of male participants. Regarding education, majority of the participants are illiterate and the DEA result there are unstable technical efficiencies levels across enterprises and across their operation scale. The study also concluded that input slack may not indicate all the details for the inefficiency of the enterprises rather it tells about wasted resource over that production periods. In the other word, input slack does not provide all the detail for the question why enterprises are inefficient. Still the calculated technical efficiency level indicated there are significant variations in the level of technical efficiency across enterprises in different years. This shows that even if the amounts of wasted inputs are zero, the level of technical efficiency score is not necessarily become 100%. On the other hands labor is the most wasted input by all enterprises as compared to other input resources. It is clear from the findings that MSEs are important tools of income generation and employment creation. Thus, the following policy recommendations are forwarded: (1) policy makers needs to capacitate participants in education and training specially empowering women the participation of female is crucial, 2) facilitating an opportunity to get enterprises access modern technology because they do not have a room to improve their level of efficiency with the current level of technology, 3) Regarding input wastage to achieve the efficient level of production the study recommends two key directions; those enterprises that lies below the frontier should need to increase their inputs while those enterprises that lie above the frontier curve should reduce their inputs.

**REFERENCES**


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