SMALL AND MEDIUM ENTERPRISES: PIVOTAL TO INCLUSIVE GROWTH IN PUNJAB

Hafiz Ghulam Mujaddad, Dr. S. M. Naeem Nawaz, Dr. Mumtaz Anwar[1]

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Abstract

Small and medium scale firms are primarily important for job led inclusive growth in the economy. Identification of sources of efficiency or inefficiency is critically important for enhancing production, firms' competitiveness and more jobs. Recognizing the gap in the literature, this study aims to measure efficiency and estimates its determinants of Small and medium scale firms in Punjab. The study used data of Enterprises Survey 2013 which is the only latest data source at firm level covering all determinants of efficiency. DEA bootstrap method is used to estimate biased-corrected efficiency measure and its confidence interval. Innovation is identified as one of the determinants which positively influence the efficiency of medium scale firms but insignificant for small scale firms. Medium scale firms operating in the industrial parks have advantage for efficiency whereas the case of small scale firms is opposite. Tax rates negatively influence the efficiency of small scale firms and insignificant for medium scale firms. There is need to develop latest technical institutions to equip human capital with innovative latest techniques. The study suggests to design industrial parks in a way that all basic facilities should be taken care of so that investors from SMEs may take benefit of being operated in close facilities. The study explored other policy options as well that help to achieve the inclusive growth strategy's objective.

Keywords: Efficiency, DEA Bootstrap Method, small and medium scale firms, Innovation, Punjab

JEL CLASSIFICATION: O14; H21; D61

[1] The authors are, respectively, Associate Research Fellow, Research Fellow and Director at Punjab Economic Research Institute, Lahore (Pakistan)
Corresponding author e-mail: ghulam.mujadid@peri.punjab.gov.pk

1. INTRODUCTION

Pakistan and the Punjab province have faced serious economic downturn in terms of economic growth and employment generation during the last decade. Out of total share of manufacturing sector in GDP ranging from 20.3 to 21 percent, small scale industry (SSI) contributes only 1.2 to 1.7 % whereas its growth is stagnant at more than 8% every year, during the last ten years. The economy of Punjab follows almost same pattern. With share of around 8% in gross fixed capital formation, more than 60% of total employment of manufacturing sector is generated by SSI which shows potential of job creation with least utilization of capital, that is, the labor-intensive nature of SSI. However, it is paramount to mention that more than 96% of the SSI is informal operating through sole proprietor and is not registered which results in non-representation in GDP. Small scale and medium scale firms have been a major source of job creation, economic growth and rapid industrialization in developing countries (Harris and Gibson, 2006; Sauser, 2005; van Eeden, Viviers and Venter, 2004; Arinaitwe, 2002; Yusuf and Schindehutte, 2000; Birch, 1987, 1981).

Punjab Growth Strategy 2014 recognizes the importance of industrialization as a tool for inclusive growth in the Punjab province and aims to overcome challenges like unemployment, lower human and physical capital productivities, stagnant exports and underutilized manufacturing capacity. On the other hand, just as of Punjab Growth Strategy, Vision 2025 of the Pakistan's government also recognizes the importance of small and medium scale firms as an engine of inclusive growth. It is to recognize that growth strategy envisioned by the Government of Punjab and Pakistan is in-line with the goal 9 of Sustainable Development Goals which addresses three aspects: infrastructure, industrialization and innovation. Physical facilities, crucial for business, are provided through infrastructure, employment generation and growth which are administered through industrialization while technological advancement of industries is triggered by innovation that further takes to the skills development. In this perspective, it is important to estimate the determinants of efficiency for small scale and medium scale firms which helps identifying the measures through which competitiveness can be enhanced. Therefore, this study aims to estimate the efficiency of small and medium scale firms, and determinants of efficiency.

Looking at the literature specific to the Punjab and Pakistan economy, we found few studies like Din, Ghani and Mehmood (2007), Burki and Terrel (1998), Memon and Tahir (2011) which focused on either specific segment or cluster of the Punjab economy in different perspective or focused on Pakistan economy utilizing DEA and Stochastic Frontier method and not the DEA bootstrap method. Naturally, the regional (provincial) economies of Pakistan have different structures and investment climates therefore focusing the provincial economy is more meaningful. Further to it, World Bank Enterprise Survey 2013 has never been used in the past to analyze the efficiency and its determinants for Pakistan as well as the Punjab Economy. As such, current study is the first attempt to analyze efficiency of small and medium scale manufacturing firms of Punjab by using bootstrapped Data Envelopment Analysis (DEA) and finding the determinants of efficiency.

This study consists of two stages; in the first stage, the bias-corrected inefficient estimates are measured and found that none of the small and medium scale firms is technically fully efficient. In the second stage of analysis, bias-corrected inefficiency scores are used as the dependent variable and OLS regression model is utilized to check the impact of drivers of inefficiency. Age of firm, size of firm, industrial park and tax rate negatively whereas average wage has positive influence the efficiency of small scale firms. On the other hand, innovation and industrial parks positively impact the medium scale firms however, size and age of firms put negative pressures. Policy makers are suggested to establish latest technical institutions equipped with the skill development required for employment in the SMEs, rationalize the tax rates keeping in view the nature of firms and structuring of industrial parks needs special attention.

The structure of the study as follow: Section 2 presents the theoretical framework of the study, followed by methodology in section 3. Section 4 presents the estimated results and analysis. Finally, section 5 concludes the study along with framing the policy suggestions.

2. THEORETICAL FRAMEWORK

Measuring the efficiency of firm is required for decision making by the managers. Efficiency is the sole criteria for any firm to stay in the market, if the firm is not efficient then it cannot compete with others. So, it is necessary for any firm/company to reach at optimal level in order to compete with their business competitors all over the world market. Traditionally, sales, share prices, exports and worker turnover etc. are utilized to show the firm performance but complete picture of the performance cannot be shown through these measures. In contrast, efficiency is a more comprehensive measure as it is based on both the inputs and outputs of the firm. A comprehensive detail of inputs and outputs is given in table 2.1 for measuring efficiency or inefficiency.

Efficiency measurement has much significance for policy makers because it is the requirement of every country to see that its organizational performance is good with high efficiency and productivity in order to achieve its targets of high growth and job creation. Further, there is need to identify the factors affecting the efficiency either positively or negatively. It provides basis for decision making on policy tools to be utilized for enhancing the deriving factors of efficiency. Understanding the level of and ways for improvement in efficiency is supportive for enhancing the inclusive growth because sustainable efficiency will encourage the firms' owners to hire more employees that will lead to reduce poverty from the region.

Table 2.1: Identification of Inputs and Outputs for efficiency measurement

Author	location and Period	Inputs	Outputs
Ramli and Munisamy (2013)	Malaysia/2001 to 2010	Operating expenditure Capital	Sales as desirable output CO_2 emission as undesirable output
Arocena and Oliveros (2012)	Spain/1994 to 2002	Labor Capital	Value added
Haron and Chellakumar (2012)	Kenya/2009 to 2011	Raw material Staff expenses Plant and machinery	Net sale Earnings after tax
Keramidou et al. (2011)	Greek/1994 to 2007	Cost of capital Cost of raw material Number of full time employees	Total sale
Barros and Assaf (2009)	Angola/2002 to 2007	Operational cost Investment premium Taxes	Production of oil
Mazumdar, Rajeev and Ray (2009)	India 1991-2005	Labour, material inputs, energy and capital	Total sales plus the change in the stock of output
Hu and Kao (2007)	17 APEC economies/1991-2000	Energy, labor, and capital	GDP
Watanabe and Tanaka (2007)	China/1994 to 2002	Capital Labor Materials (coal)	Desirable output is industrial products Undesirable output is sulfur dioxide
Baten et al. (2006)	Bangladesh/1981/1982 to 1999/2000	Capital Labor	Value added

Source: Authors' own compilation

Hall (2011) measured the relationship between productivity and innovation. He found that product innovation behaves differently depending on the size of the firm but still product innovating firms are 8 percent more productive than non-innovating firms on average. He also found that results of process innovation are ambiguous. He argued that negative effect of process innovation is possible when its quantity effect in real terms is not possible to measure. Hall et al. (2011) analyzed the same relation for the case of Italy and found positive impact of product innovation and negative impact of process innovation. Griffith et al. (2006) measured the relationship by using the product and process innovations dummies and found that process innovation positively influences the productivity in France and product innovation had positive impact for France, Spain and UK while negative impact in the case of Germany.

It is imperative that tax rates show different behavior regarding firms especially the manufacturing firms. Johansson at al. (2009) investigated the impact of tax structure on firm performance. It is found that corporate taxes are most harmful for growth, followed by personal income taxes and consumption taxes. Mirlees et al. (2011) incorporates the arguments that many countries have different programs which selectively reduce the tax burden of small and medium size firms to enhance their market entry and business expansion. Effective corporate tax burdens show different behavior for different sized firms. Hanlon et al. (2007) found evidence that large and more efficient firms pay less tax on average. There is a possibility that larger firms pay less taxes due to the existence of professional tax planning department in these large firms.

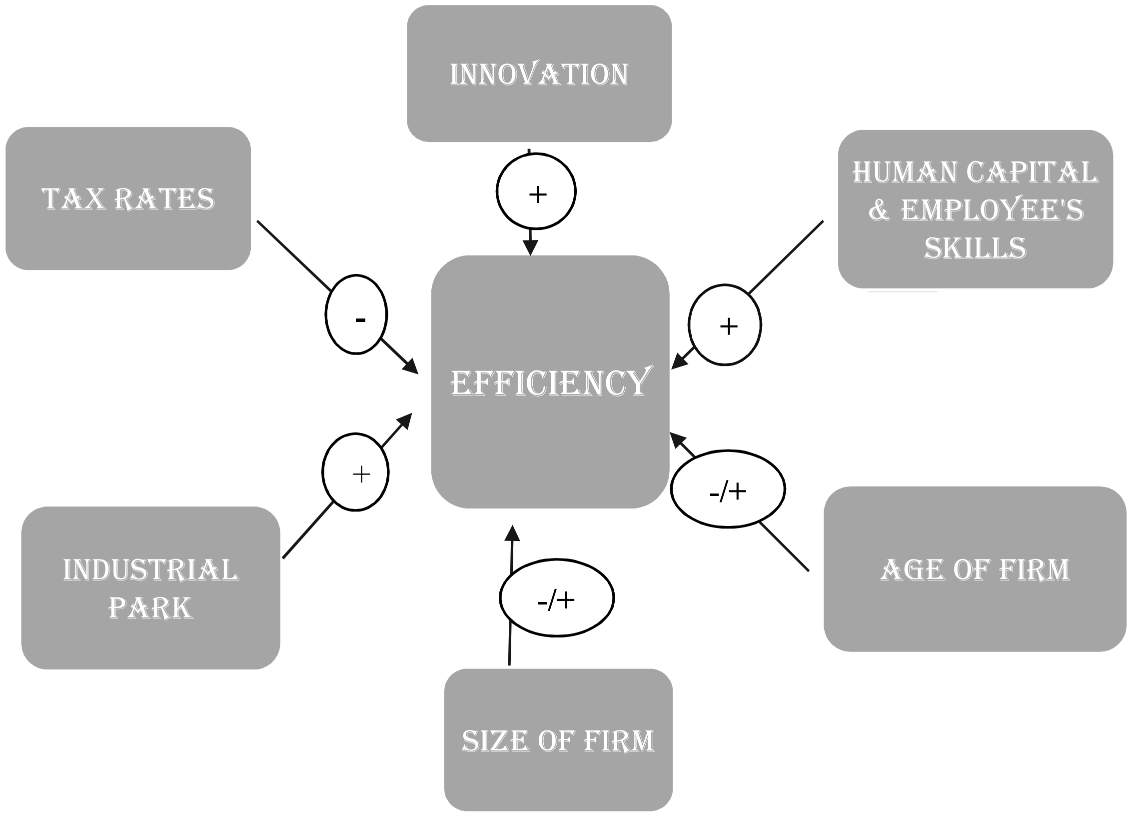
Keramidou (2011) measured the technical efficiency of sausage industry of Greece and its determinants for the period 1994 to 2007. He measured different sources of technical efficiency and found that half of the variables negatively contribute in efficiency. He argues that accumulated experience of firm and knowledge are not the source of obtaining better level of efficiency, that is why, age of firm negatively contributes in efficiency. Size of firm has a negative impact on efficiency, indicating the proof of diseconomies of scale or underutilization of production capacity. Shee and Stefanou (2016) found both learning and unlearning evidence at firm level analysis of Colombian food manufacturing. He argued that differences in training, quality level of an individual and technological infrastructure in any firm are primary causes of differences in learning across firms. Benkard (2000), Thompson (2007) and Brachet and David (2011) explain the reasons of unlearning effects i.e. depreciation of employees and firm level experience and deteriorating skills in labour force leads to unlearning effects of firms. The learning mechanism could be similar to that of Jovanovic (1982) and firms must learn about their unobserved demand level which is subject to transient preference shocks.

Porter (1990) defined briefly that industrial networking under industrial parks/clusters enhance the productivity of firms and it leads to the competitiveness of the industrial sector of the country. He emphasizes that standard of living of a nation directly relies on the potential of its firms to get high level of efficiency and nation's ability to enhance productivity over the period of time. Park, Shin & Kim (2010) explain the same fact that firms networking in a cluster or industrial park is expected to improve learning, surge flexibility to respond to fluctuating circumstances, and gain easy and open exchanges of information. Clustering has positive and significant effect on firm growth and it is also required for the survival of firms. However, positive influence of industrial parks or clusters primarily depends on the structure available or provided to the firms.

Soderbom & Teal (2001) analyzed the impact of human capital on earnings and productivity. It is found that human capital is the major source of productivity enhancement and it leads to higher earnings. Elnaga & Imran (2013), through survey of literature, nicely captured the point of concern on how training programs enhance the employee performance. Training develops self-efficacy and results in superior performance on job (Svenja, 2007). Some authors utilized the average wage as proxy for human capital and employee's skill because both human capital and training are sources of higher wages, so it is rational to take the average wage as proxy of these indicators as Keramidou (2011) and Kravstova (2008) utilized it as proxy of human capital and employee's skill. Keramidou (2011) found that there was a positive impact of average wage on efficiency.

The above highlighted discussion highlights the importance of measuring efficiency and its determinants for identification of policy measures so that benefits of inclusive growth and job creation can be accrued. Figure 2.1 depicts the model of efficiency, showing the factors affecting the efficiency positively, negatively or ambiguous.

Figure 2.1: Theoretical framework of efficiency drivers



Source: Authors' own compilation

3. METHODOLOGY

Farrell (1957) was the first who introduced how to measure the efficiency of producing units technically. A lot of work is done on Farrell's (1957) classical technical efficiency concept. It is obvious that there are two basic techniques for the measurement of technical efficiency: parametric and non-parametric. Meeusen and Van den Broeck (1977) and Aigner et al. (1977) initiated the parametric technique which is known as Stochastic Frontier Analysis (SFA). The SFA technique demands specification of functional form and estimates the cost frontier such as parametric approaches require some assumptions. The main quality of this technique is to incorporate the stochastic error in the specification of the model. The main problem of this technique is the enforcement of the distributional assumption of the error term and SFA technique is sensitive with respect to the parametric functional form. Further, Mahadevan (2002) said that "Different specifications of the production function under the parametric approach provide different results and this is a serious methodological problem."

Charnes et al.'s (1978) and Fare et al. (1985) linear programming models provided the base for the production efficiency analysis which is now used to assess the capacity utilization Where the convexity assumption is adopted in the literature, those techniques are known as DEA. Charnes, Cooper, and Rhodes (1978) developed the DEA and further modified by Banker et al. (1984) which is based on the frontier efficiency concept, defined by Farrell (1957). It is a non-parametric technique and used for measuring the efficiency of decision making units (DMUs). It does not demand assumption of any specific functional form with respect to the inputs and outputs or the setting of weights for the various factors. DEA creates an efficient frontier for every observation. There are two approaches which are used to measure the efficiency by using the DEA. First is input oriented, i.e. to produce the given level of output by utilizing the minimum inputs and second is output oriented, i.e. to produce the maximum level of output by using the given set of inputs. For general overview of DEA approach, see Coelli et al. (2005).

In 1998 and 2000 Simar and Wilson identified the severe restrictions with the DEA approach. They explained a number of limitations in their studies such as:

1. Efficiency scores are serially correlated when it is calculated by DEA.
2. DEA does not give any interpretation of data generating process (DGP).
3. Having uncertainty about what is being estimated in the DEA.

Because of these limitations, we use Simar and Wilson (1998, 2000) DEA bootstrap technique which gives reliable and statistically significant results within DEA models. DEA bootstrap technique estimates the efficiency scores by using output oriented approach and measures inefficiency by using input oriented approach and confidence intervals for individual production efficiency scores by Simar and Wilson (1998). We are employing DEA bootstrap technique to measure the bias corrected estimates of production level for Small and Medium manufacturing firms of Punjab separately.

Input oriented variable returns to scale (VRS) model is used for getting the inefficiency scores because constant returns to scale (CRS) is employed where industries or firms operate at their optimal scale. In the scenario of this study, there is considerable evidence that industries are not working at their optimal scale due to the inclusion of varying sector of firms, imperfect competition and financial constraints. The input-oriented DEA efficiency estimator $\hat{\Theta}_{ivrs}$ for any data set (x_i, y_i) for each firm can be obtained by solving the following linear programing equation.

$$\hat{\Theta}_{ivrsi} = min(\Theta > 0 | Yi \leq \sum_{i=1}^{n} \Upsilon i Yi; \Theta i Xi \geq \sum_{i=1}^{n} \Upsilon i Xi; \sum_{i=1}^{n} \Upsilon i = 1; \Upsilon i \geq 0, i = 1, \dots . n) \quad (1)$$

In equation (1), x and y are observed inputs and outputs and i=1….,n is the specific firm. The $\Theta i Xi$ is the efficient level of inputs, Θ is the scalar and Υi is the non-negative vector of constant defining the optimal weights of inputs to outputs. The obtained value of $\hat{\theta}_{ivrsi}$ is the technical inefficiency estimate for ith firm. In case of input oriented, inputs should be decreased for getting the higher technical efficiency where $\hat{\theta}_{ivrsi}$=1 means that the firm is considered fully efficient while $\hat{\theta}_{ivrsi}$>1 means that the industry is inefficient and it needs to reduce the inputs for reducing the inefficiencies.

There are two things to be noted relating to the above equation (1). First, in this linear program VRS is assumed and second, Simar and Wilson (2000) observe that $\hat{\theta}_{\mathbf{vrsi}}$ is the downward biased estimator, as firm frontier can be underestimated. Due to limitations of DEA, the smooth bootstrap technique of Simar and Wilson (1998, 2000) is applied in this study for getting the bias-corrected efficiencies and their confidence intervals accompanied by the DEA with bootstrapping approach.

There are seven steps to perform the DEA bootstrap as described here.

(a) Solve the equation (1) and obtain $\hat{\Theta}_{1....}\hat{\Theta}_n$
(b) Produce a sample $\beta_1\tilde{}....,\beta_n\tilde{}$ from $\hat{\Theta}_{1....}\hat{\Theta}_n$
(c) Sample values will be smoothed by using the formula as given:

$$\tilde{\theta}i* = (\beta\tilde{i} + h\dot{\varepsilon}i \ \ if\ \beta\tilde{i} + h\dot{\varepsilon}i \ \geq 1\ or\ 2 - \beta\tilde{i} - h\dot{\varepsilon}i\ if\ \beta\tilde{i} + h\dot{\varepsilon}i > 1)$$

Where *h* is the bandwidth of a standard kernel density and $\dot{\varepsilon}$i is a random error.

(d) Adjusting the smoothed sample value by utilizing the following formula for getting the value of Θ_i*:

$$\Theta_i* = \beta\tilde{} * + \frac{\tilde{\theta}i* - \beta\tilde{}*}{\sqrt{1+h2/_{\varphi 2\theta}}}$$

Where $\beta\tilde{}\ *=(1/_n)\sum_{i=1}^{n}\beta\tilde{i}$ and $\varphi 2\theta$ is the sample variance of $\hat{\Theta}_{1....}\hat{\Theta}_n$

(e) Estimate the pseudo data set using by $\hat{\theta}i/_{\theta i*}$

(f) By solving the equation (1), calculate the bootstrap estimate $\hat{\Theta}_i$*vrs.
(g) Repeat these 5 steps "b-f" 2500 times to provide a set of estimates.

We have used three inputs and one output to measure the input oriented technical inefficiency by using the DEA Bootstrap. Inputs and output are selected after careful analysis of the literature. There are three inputs; (i) number of production workers, (ii) Capital which is determined by the, hypothetically, if the establishment were to purchase the assets like machinery, vehicles, equipment and land and building which it uses now, in their current condition and regardless of whether the establishment owns them or not, how much would they cost, independently of whether they are owned, rented or leased, (iii) Cost of Energy which is determined by adding the total annual costs of fuel and total annual costs of electricity, and one output i.e. fiscal year's total sales. The utilized data is in "000" rupees for all variables except for labour. The whole data is collected from World Bank Enterprise Survey 2013. The Enterprise Survey is conducted by Private contractors on behalf of the World Bank. The Enterprise Survey is answered by business owners and top managers. The stratified random sampling is used for this survey. The Enterprise Surveys Unit uses two instruments: the Manufacturing Questionnaire and the Services Questionnaire. We have utilized Manufacturing Questionnaire for collecting the data for measuring the input oriented technical efficiency in this study.

The bias-corrected technical inefficiency scores, which will be estimated through DEA bootstrap, will be taken as dependent variable to find out the determinants for reducing the inefficiency. Data for determinants of efficiency/inefficiency is also utilized from Enterprise Survey 2013. In the second step of estimations, a single OLS regression will be employed for regressing these input oriented technical inefficiency of all firms against a set of explanatory factors in the following regression model for small and medium scale separately for the sake of comparison. The same model is used in both small and medium scale firms' regressions:

$$\hat{\hat{\theta}}i = \beta 0 + \beta 1AWi + \beta 2SZi + \beta 3Inni + \beta 4Agei + \beta 5Taxi + \beta 6IndPi + \varepsilon i \quad (2)$$

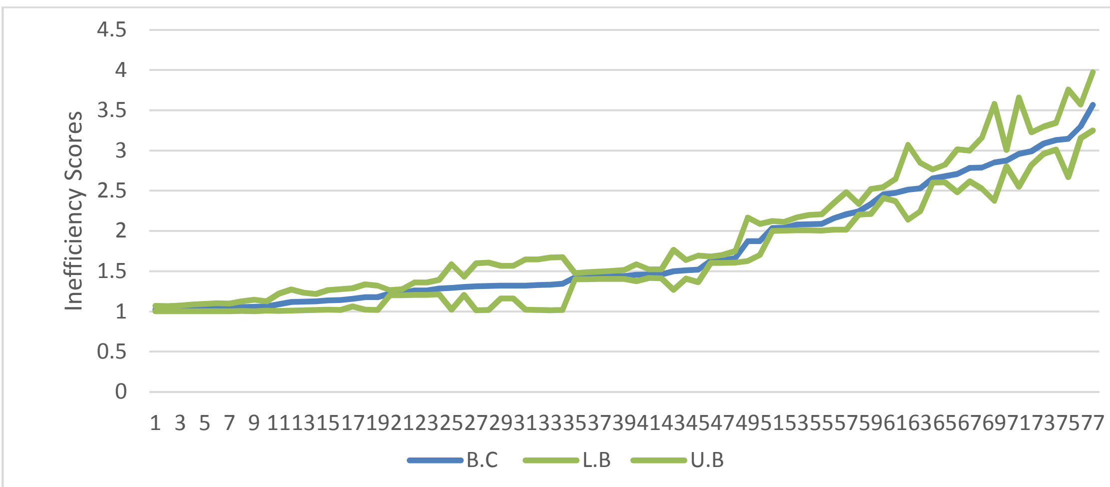
$\hat{\hat{\theta}}_i$ is the estimated technical inefficiency scores based on the assumption of the variable returns to scale.

Where AW represents the average wage which is calculated by the total cost of salaries divided by number of employees, which is counted as the employee's skill and human capital (for example see Kravtsova, 2008). *SZ* is the industry size which is calculated by taking the logarithm of total fixed assets of the firm, which is considered as a proxy for the economies of scale of the firm in this study (for example see Lin *et al.,* 2009; Yusuf and Malomo, 2007).*Inn* represents the Innovations which is taken as dummy by measuring as , in the last three years, did the firm give employees some time to develop or try out a new approach or new idea about products or services, business process, firm management, or marketing. *Age* represents the age of firm which is used as the proxy for learning by doing of firm. *Tax* represent the tax rate which is taken as dummy variable to check that how much it is cause of inefficiency for small and medium scale firms. *IndP* represents that firm is located in industrial park or not which is taken as dummy variable to see whether the firm located in industrial park leads to efficiency or inefficiency in both cases.

4. EMPIRICAL ANALYSIS

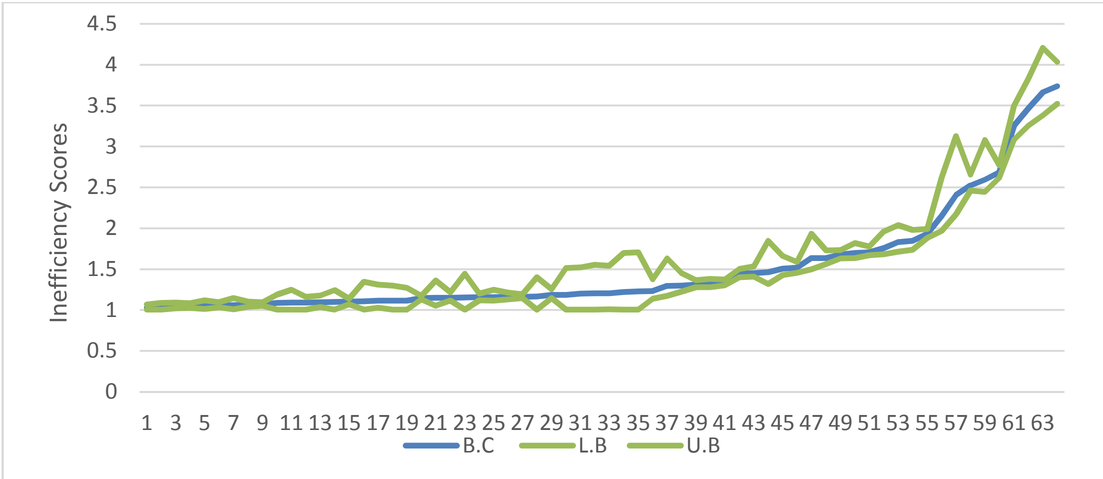
In the first stage of analysis, we measured the VRS Bootstrapped technical inefficiency scores of small and medium firms of Punjab by using the Input Oriented DEA Bootstrap technique. We have utilized the data of Enterprise Survey 2013 for this analysis. The results of Input oriented efficiency scores are shown in the form of figure 4.1 and 4.2 for small scale firms and medium scale firms of Punjab respectively. The results of simple DEA are not portrayed in these figures because it is well known that DEA exaggerates the efficiency score meaning thereby it reduces the inefficiency estimates and underestimates the efficiency frontier as discussed by the Simar and Wilson (2000) in the limitations of DEA. Biased corrected inefficiency scores, which are represented by the B.C while lower bound and upper bound of confidence interval are presented with the name of L.B and U.B in these figures for small scale and medium scale firms.

Figure 4.1: Bootstrapped DEA and Confidence Intervals for Small Scale Firms of Punjab



Source: Authors' own estimation by using R 2.14.0 with FEAR 1.15

Figure 4.1: Bootstrapped DEA and Confidence Intervals for Medium Scale Firms of Punjab



Source: Authors' own estimation by using R 2.14.0 with FEAR 1.15

It can be observed that bias corrected inefficiency scores, which are derived after 2500 simulations, define right estimates and remove the exaggerated bias from the results. The further beauty of these estimates is that they also lie in the confidence interval as it can be observed in figure 4.1 and 4.2. Input oriented technique is utilized in this study, so the firm which is gaining the efficiency score 1 represents the technically fully efficient level while estimated efficiency score is greater than 1 shows the inefficient or less efficient firm. In case of input-oriented model, fixed output is gained by utilizing the different set of inputs. So, for minimizing the inefficiencies, use of inputs should be reduced for getting the same level of output.

It is found that there is not any firm which is fully efficient by using the Enterprise Survey for both small and medium scale firms in the case of bias corrected estimates. The overall average inefficiency score of small scale firms is 1.76 which shows that 0.76 times are utilizing more inputs for producing the same output. The overall average inefficiency score of medium scale firms is 1.51 which shows that 0.51 times are utilizing more inputs for producing the same output for medium scale firms. It can be noticed from these figures that medium scale firms are less inefficient than small scale firms. The determinants of both small and medium firms will help us to identify that which sources are the main cause of more inefficiency in small scale rather that medium scale firms.

After measuring the inefficiency scores for small and medium scale firms, determinants of inefficiency have been investigated by applying Ordinary Least Square (OLS) regression. Results of determinants of efficiency/inefficiency are presented in Table 4.1 for small scale firms in Punjab.

Table 4.1: Regression Results of Small Scale and Medium Scale Firms in Punjab

	Small Scale Firms	Medium Scale Firms
VARIABLES	Inefficiency	Inefficiency
Innovation	-0.180 (0.245)	-0.399** (0.173)
Tax Rate	0.155*** (0.0585)	0.0364 (0.0563)
Average Wage	-4.35e-05*** (1.03e-05)	5.70e-06 (0.000156)
Firm Located in Industrial Park	0.376** (0.173)	-0.303* (0.163)
Age of Firm	0.0162** (0.00681)	0.0163* (0.00868)
Size of Firm	0.103** (0.0459)	0.106** (0.0476)
Constant	-0.582 (0.711)	-0.589 (0.728)
Observations	77	64
R-squared	0.239	0.243

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Innovation causes reduction in inefficiency as a matter of theory because more innovation leads the employees more efficient in the production process yielding high production at less cost. High competitiveness as a result increase the market share of firms, generate more employment and profits for the firms. However, our results show insignificant impact of innovation on inefficiency in the case of small scale firms while there is negative and significant impact on inefficiency in the case of medium scale firms. Small scale firms are not capable enough to provide more opportunities to employees. The results are supported by the fact that around more than 87% of the small-scale firms in the data set do not adopt innovation as a business strategy and ultimately have insignificant impact on inefficiency or efficiency. However, it does not mean in any way that innovation is not important for improvement in efficiency. More innovation means more efficiency as in the case of medium scale firms because medium scale firms are capable enough to provide more opportunities to employees in form of teaching new production techniques etc. as discussed by Hall (2011), Hall et al. (2011) and Griffith et al. (2006). It yields an important consideration that firms should be innovative enough to increase efficiency, that is, innovation as a matter of business strategy should be adopted for which the culture of R&D must be adhered.

Tax rate has ever been deteriorating for firms doing business at small scale. Taxes at multiple layers in developing countries born by the small-scale firms' results in decrease in profits because of increase in cost of administering business (Carnahan, 2015). The results show that increase in tax rate causes more inefficiency on the part of small scale firms while tax rate is insignificant in the case of medium scale firms. The rationale for this insignificance can be justified from the finding of Hanlon et al. (2007) that large and more efficient firms pay less tax on average. It calls for rationalizing the taxes on small scale firms in Punjab.

Human capital and skills, measured by average wage rate offered to production workers, has negative impact on inefficiency, as expected while insignificant in case of medium scale firms. It shows that with the increase in the quality of human capital, efficiency of small scale firms increases. The results are in line with the literature such as Soderbom & Teal (2001), Svenja (2007) and Mujaddad and Ahmad (2016).

Industrial parks positively influence the inefficiency in the case of small scale firms while it has negative impact on inefficiency as shown in results of table 4.1. Porter (1990) and Park, Shin & Kim (2010) explained that industrial networking has positive impact on learning then it leads to efficiency/growth of firms. The prerequisite of this impact is that management and collaboration mechanism in models followed for development of industrial parks has an important role to play for improving efficiency. As an example for successful models of industrial parks, Chinese models are greatly successful because of provision of all the basic infrastructure, living standards, working environment and the tax incentives for the foreign investors whereas consistency of policies and collaboration with foreign partners are basic ingredients. On the other hand, lack of sufficient funds having no collaboration with foreign partners and no special investment incentives in the form of relaxation in taxes are the basic features of industrial estate models of Pakistan. Development of industrial parks can be proved as a success story for improvement in efficiency in Punjab for small scale firms if the industrial parks are designed considering the models of China.

Thompson (2007) and Brachet and David (2011) suggest that due to depreciation in employee and firm level experience, firms reveal negative effect of learning or age of firms on efficiency. The results depict positive influence of age of firms on inefficiency or negative effect of age of firms on efficiency in both cases of small and medium scale firms which may be due to depreciation of mixture of employee and firm level experience over time. Less innovation overtime results in lagging behind the more innovative firms which are more focused on learning. Further, decay in skill and high labor turnover also yields negative impact of age of firm on efficiency (Brachet and David (2011).

Capital, proxy for economies of scale, show its positive impact on inefficiency which depicts that firms are operating at less than their potential, that is further production capacity is available with the available capital in both cases. The evidence shows an average efficiency level of 56% meaning thereby the possibility of increase in output by 44% with the same set of available inputs in small scale while 34% capacity is available in medium scale firms. The relationship is against the Gibrats' law[2] as suggested by Liu et al. (1999), and according to the results of Yasuda (2005) and Park Shin & Kim (2010).

5. CONCLUSION

Efficiency of small and medium scale manufacturing firms is measured for understanding the policy measures through which inclusive growth can be achieved through employment of resources ultimately. Performance analysis is one of the main objectives of the managers of establishments because they want to know how well are their firms working under the given resources. Efficiency analysis also helps them to see how beautifully decisions are made in past and how they can bring their establishment to the top position. For measuring the efficiency, there are many techniques but in this study, input oriented DEA bootstrap approach is utilized because it is more suitable technique as compared to the existing approaches. It is found that innovation positively and significantly enhance the efficiency in medium scale firms while insignificant in small firms because small scale firms are not capable enough to provide more opportunities to employees. Tax rate are negatively and significantly influence the efficiency in small scale firms but insignificant in the case of medium scale firms as expected. Human capital and employee's skill is insignificant in medium scale firms while it has significant and positive impact of efficiency in small firms. Result of Industrial park is very interesting as it has negative impact in case of small scale firms and positive for medium scale firms. Incomplete provision of structure, the inappropriate design of industrial parks, and lack of vertical and horizontal integration of firms within the industrial parks are potentially the primary reasons. Age of firm has negative impact on efficiency in small and medium scale firms as firms do not show the learning behavior. It is found that there is no evidence of economies of scale in the manufacturing firms in both cases as production capacity is not well utilized.

On the basis of our results, it is suggested that there is need to establish latest technical institutions for the guidance of the labor and to equip them with the modern techniques required by the small and medium scale firms. Secondly, tax rates need to be rationalized for small scale firms and there is need of tax holidays for small scale firms, for attracting the investment and creating jobs in the economy. Thirdly, Industrial Parks needs to be well structured for which success stories from China, Russia and Singapore can be used as bench mark.

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[2] Rate of growth/efficiency of a firm is independent of its absolute size

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